```
Page
```

```
!!tle:
!erfect score:
sequence:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Run
                                                                                                                                                                                                                                                                                                                                                                               Database
                                                                                                                                                                                                                                                                                                                                                                                               Post-processing: Minimum Match
Maximum Match
Listing first
                                                                                                                                                                                                                                                                                                                                                                                                                                   Minimum DB
Maximum DB
                                                                                                                                                                                                                                                                                                                                                                                                                                                              Total number of
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Searched:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Scoring table:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  OM nucleic
                                                                                                                                                                                                                                                                                                                                                                                                                                   geq
Qeeq
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   •
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 nucleic search, using
                                                                                                                                                                                                                                                                                                                                                                                                                                   length: 0
length: 2000000000
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          US-09-939-408A-12
2419
1 ctcctgcctcactct:
                                                                                                                                                                                                                                                                                                                                                                                                                                                             hits satisfying chosen parameters:
  4499874833333409874554321
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               IDENTITY_NUC Gapop 10.0 , Gapext 1.0
                                                                                                                                                                                                                                                                                                                                                                                                                                                                               3470272 seqs, 21671516995
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               September 11,
                                                                                                                                                                                                                                                                                                                                                                               GenEmbl: *
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           ctcctgcctcactctaaccc....
                                                                                                                                                                                                           gb_pat.*
gb_ph.*
gb_pt.*
gb_pr.*
gb_pr.*
gb_ro.*
gb_sts.*
gb_sts.*
gb_vi.*
gb_vi.*
em_ba.*
em_fum.*
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Copyright
                           em_htg_inv: *
em_htg_inv: *
em_htg_other: *
em_htg_mus: *
em_htg_pln: *
em_htg_pln: *
em_htg_rod: *
em_htg_wram: *
em_htg_vrt: *
em_htg_vrt: *
                                                                                                                                                                                                                                                                                                                                         *: wo_de
em_htgo_hum:*
em_htgo_mus:*
em_htgo_other:*
                                                                                                                    em_mu...
em_om...
em_opt...
em_patt...
em_patt...
em_sts...
em_un...
em_un...
                                                                                                           em_vi:*
                                                                                                                                                                                                                                                                                                                                                                    ba:*
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             GenCore version (c) 1993 - 2004
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                2004, 10:06:53
                                                                                                                                                                                                                                                                                                                                                                                                100%
45 summaries
                                                                                                                                                                                                                                                                                                                                                                                                                   0%
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  sw model
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                residues
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           ....gagttcaaaaaaaaaaaaa
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             i3 ; Search time 14891.6 Seconds
(without alignments)
7040.653 Million cell updates/se
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Compugen
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ltd.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               cell updates/sec
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            2419
```

Pred. No. a Te the number of results predicted by chance to

DEFINITION
ACCESSION
VERSION
KEYWORDS
SOURCE
ORGANISM

12 from patent

GI:20249676

Unknown. Unknown.

Unclassified.

REFERENCE

TITLE JOURNAL

1 (bases 1 to 2419)
Yoshida,R.K. and Kootstra,A.B.
Phenylalanine ammonia lyase polypeptide and polynucleotide
sequences and methods of obtaining and using same
Patent: US 6355468-A 12 12-MAR-2002;

score greater than or equal to the score of the result being printed, and is derived by analysis of the total score distribution.

SUMMARIES

## Result No. RESULT 1 AR199602 LOCUS 0000 11136.6 8020.4.6 8020.4.4 74020.4.4 40020.4 40020.6 10 1629 1196.6 1196.6 1196.6 1196.6 1196.6 1195 1195 1195 1195 1195 1195 1198.8 1196.6 1196.6 1196.6 1196.6 1196.6 Score AR199602 Sequence 12 AR199602 AR199602.1 Query Match Length BB MY224546 MY2EPAL AX650228 OSJN00274 OSJN00262 AC135419 AC135429 AC135429 AC135429 AC135420 AX650248 AX650254 AX650257 AX660257 AX660257 AX660257 AR205031 AR282638 AX082542 AX370657 AR282658 AX3706611 AR199604 AR196864 RHD9AL RTPAL2 ARC853389 AX660330 E01783 E01784 E01785 AR199605 AX366866 E01543 AR199602 AX366860 AX366876 AR199606 AX366868 E01759 AR205032 AR28282639 AX082544 AX370659 ij RTPALGNA 2419 US 63 ALIGNMENTS 19 bp 6355468. DNA linear E01759 DNA encodin AR205032 Sequence AR282639 Sequence AX082544 Sequence AX082544 Sequence AX370659 Sequence E01783 DNA sequenc E01785 DNA sequenc E01785 DNA sequence AX37066866 Sequence E01543 L-phenylala AR205031 Sequence AX370657 Sequence AX370657 Sequence AX370657 Sequence AX370657 Sequence AX370658 Sequence AX370659 Sequence AX370659 Sequence AX370659 Sequence AX370659 Sequence AX3653389 Sequence AX3653389 Sequence AX653389 Sequence AX660252 Sequence AL731629 Oryza sat AL731616 Oryza sat AL731616 Oryza sat AC135419 Oryza sat AC135419 Oryza sat AC135421 Oryza sat AX65420 Sequence AX65420 Sequence AX660254 Sequence AX660254 Sequence AX654210 Sequence AX660254 Sequence AX654210 Sequence AX660252 Sequence AR199602 Sequence AX366860 Sequence AX366876 Sequence AR199606 Sequence AX366868 Sequence Description PAT 20-APR-2002

, pp od pp od od od od	Db Qy Db	0 Db 4	\$ B \$ B	,	40 AG	94 da 40	Db Qy	FEATURES SOURCE SOURCE ORIGIN Query Matches
781 ATCATGTTTGCGCGCGAGGCCATCTCGCTCTTTTGGTCTCGAGGCAGTCGTCCTCGGCCCG 840	161 GTCCCCCTCCGCGGCTCCATCTCGGCGTCGGCGCGACCTCAGCCCGCTCTCGTACATCGCC 72  721 GGCGCCATCACCGGTCACCCCGACGTCAAGGTTCACGTTTTGCACGAGAGCGAACCGAGAAG 78  721 GGCGCATCACCGGTCACCCCGACGTCAAGGTTCACGTTTTGCACGAGGAACCGAGAAG 78		AGGACTGAGGATGCAGTCAGCCTCCAGAAGGCGCTCATCGAGCACCAGCTCTGCGGCGTG 4 ACGCCGACGTCCGYCTTCAGCGTCGGACGACGGCCTCGAGAACACGCTTCCGCTC 5	61 GCCCAGCTTCAGAACTCGGTCTACGGAGTCACCACGGGTTTCGGTGGCTCGGCCGACACG 42	241 AGCGGGTACAGCCTCACCGTCGGTACAGGTTGTCGGCGCCGCCAAGAGGGGCGCAGGGTC 300	121 GCGGGCCCACTTCGGCTCTCCGCCGCACGCCCGACGCTCGATGGCCACGCCGCGCACCAG 180	1 CTCCTGCCTCACTCTAACCCGTCACTAGCACTGCGATGGCCCCTTCCTT	Location/Qualifiers  12419 /organism="unknown" /mol_type="unassigned DNA" /mol_type="unassigned DNA
0 Db QQ Db Ob	0	Q	Q D Qy	2y 2y Db	5 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	S & & & &	5	,
	CTTGCGCCTCGAGGTCAAGAAGGCGCTCAACAA; CTCGAGCCGCCGCTGGCACGACGCCCTTCTCGTA;	1621 CTCGCCTCGCACCTGTACTGCACCTCCAGCCGTCCAGCCAG	561 TGGCTCGCTCTCATCTCCGCGGGGCCGACTGCCGAGGGCCAACGACGTCCTTTC	1441 AACTATCACGGCAAGGGCTTGGACATTCACACTGCTGCTTACGCTTCGGAGCTCGGCCAC 1500	321 ANGACCAGELLOCIC LA LOCCAGA CARCAGO	201 TACTCGACTCTCGCGAGAACAACACGACGACCAACCACCGCTCCTCGACGTCGAG 201 TACTCGACTCTCTCGCGAGGACCAACACACCGACCACCACCACCACCTCCTCGACGTCGAG 201 TACTAAGCAGACCGCCACGGCGGCAACTTCCAAGGCGTCGGCTGTCTCGATTTCGATGGAG 261 AACAAGCAGACCGCCACGGCGGCAACTTCCAAGGCGTCGGCTGTCTCGATTTTCGATGGAG 261 AACAAGCAGACCGCCACGGCGGCAACTTCCAAGGCGTCGGCTGTCTCCGATTTTCCATGGAG 261 AACAAGCAGACCGCCACGGCGGCAACTTCCAAGGCGTCGGCTGTCTCCGATTTCCAATGGAG 261 AACAAGCAGGCGCCACGGCGCCAACTTCCAAGGCGTCGGCTGTCTCCGATTTCCAATGGAG 261 AACAAGCACGCCGCCACGGCGCCAACTTCCAAGGCGTCGGCTGTCTCCGATTTCCAATGGAG 261 AACAAGCACGACGCCGCCACGGCGCAACTTCCAAGGCGTCGGCTGTCCCGATTTCCAATGGAG 261 AACAAGCACGACGACGACGACGACACACACACACACACA	GENGELCANGS LANGSAKGAK GAKGAGGATI ELI GELCAGGACGAGAGA CALGAGGAGACAT AGALGAAGAACGAGAGAGACAT CETT GGCCAGAGACGAGAGAGAGACAT CETT GGCCAGAGACGACGAGAGACAT CATT CETT GGCAGACACGAGACAT GAT GCAGAGACAT GAT GAT GAT GAT GAT GAT GAT GAT GAT G	961 GCCATGGTCGGCCAGCAGGGCTCGTTCGCGCCGTTCATCCACGACGTCTGCCGCCCGC

|--|

```
1981
                                            2041
                                                                                                          1981
                                                                                                                                       1921
                                                                                                                                                                                                   1861
                                                                                                                                                                                                                                 1861
                                                                                                                                                                                                                                                                1801
                                                                                                                                                                                                                                                                                                                          1741
                                                                                                                                                                                                                                                                                                                                                      1741
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1321
                                                                                                                                                                                                                                                                                                                                                                                       1681
                                                                                                                                                                                                                                                                                                                                                                                                                                                 1621
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1621
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1561
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1441
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1441
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1381
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1321
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1141
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1141
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1081
                                                                                                                                                                    1921
                                                                                                                                                                                                                                                                                           1801
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1261
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1261
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1201
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1201
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1081
                                                                                                                                                                                                                                                                                                                                                                                                                    1681
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1561
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1501
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1501
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1381
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1021
                                                                         TGGCAGACGCCGTCTTCGCAGGCGCCCGGCGCACGCATACCTCTCGCCGCGCACGCGCGTC
                                                                                                                                                                                                                    GTCGTCGAGCTCCTCTCGTCCTCCGCCCTCTGCCAACGTCACCCTTACTGCCGTCAACGCG
                                                                                                                                                                                                                                                                                                                                            CTCGACGTCAACGCACTTGCGCTCGAGGTCAAGAAGGCGCTCAACAAGCGTCTCGAGCAG
                                                                                                                                                                                                                                                                                                                                                                                                     TTCAAGAAGCAGTTCGACCCGCTTCTCCCGACTCCTCCCAGCAGCACCTCGGCACTGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CCCGGCCAGGTCGAGGTCGCGCAACATCCGCACGCTCCTTTCCGGCTCGTCGTTTGCCC
                 CTGTACTCGTTCGTGCGCGAGGAGCTCGGCGTGCAGGCGCCGCCGCCGACGTGTTTGTC
                                CTGTACTCGTTCGTGCGCGAGGAGCTCCGCGTGCAGGCGCCGCCGCCGACGTGTTTGTC
                                                                                                                                                       TGGAAGGTTGCCTCGGCCGAGAAGGCCATCTCGCTCACGCGCGAGGTGCGCAACCGCTTC
                                                                                                                                                                                                                                                                                 ACGACGACGTACGACCTCGAGCCGCGCTGGCACGCACGCCTTCTCGTACGCGACCGGCACC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                   CTTGCCAACCCGGTCACTACCTTCGTCCAGCCCGCAGAGATGGGCAACCAGGCCGTCAAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CTTGCCAACCCGGTCACCTACCTTCGTCCAGCCCGCAGAGATGGGCAACCAGGCCGTCAAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            AACTATCACGGCAAGGGCTTGGACATTCACATCGCTGCTTACGCTTCGGAGCTCGGCCAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      GTTGAGCACGAGGAGGAGGTCAAGGTCAAGGACGACGAGGGCATTCTTCGCCAGGACCGC
                                                                                                                                                                                                   GTCGTCGAGCTCCTCGTCCTCGCCCTCTGCCAACGTCACCCTTACTGCCGTCAACGCG
                                                                                                                                                                                                                                                                ACGACGACGTACGACCTCGAGCCGCGCTGGCACGACGCCTTCTCGTACGCGACCGGCACC
                                                                                                                                                                                                                                                                                                                          CTCGACGTCAACGCACTTGCGCTCGAGGTCAAGAAGGCGCTCAACAAGCGTCTCGAGCAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                 CTCGCCTCGCACCTGTACTGCACGCTCCAGGCCGTCGACCTCCGCGCGATGGAGCTCGAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 TCGCTCGCTCTCATCTCCGCGCGCGCGCACTGCCGAGGCCAACGACGTCCTTTCTCTCCTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    TCGCTCGCTCTCATCTCCGCGCGCGCACTGCCGAGGGCCAACGACGTCCTTTCTCTCTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 AAGACCAGGCTCGCACTCGCCCTCATCGGCAAAGCTTCAACTTCACGCAGTGCAACCGAGTTG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            AACAAGCAGACCGCGCACGGCGAACTTCCAGGCGTCGGCTGTCTCGATTTCGATGGAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 TACCCGCTCGCACGTCGCCTCAGTTCCTCGGCCCGCTCGTGGAGGACATGATGCACGCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     AACTATCACGGCAAGGGCTTGGACATTCACATCGCTGCTTACGCTTCGGAGCTCGGCCAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   CTCAACGCTGCCATGAACCGCGGCCTGCCTTCGTGCCTCGCTGCCGAGGACCCGTCGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               AAGACCAGGCTCGCACTCGCCCTCATCGGCAAGCTCAACTTCACGCAGTGCACCGAGTTG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          AACAAGCAGACCGCGCACGGCGAACTTCCAGGCGTCGGCTGTCTCGATTTCGATGGAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      TACTCGACTCTCTCGCTCGAGAACAACACGACGACAACCCGCTCCTCGAGGTCGAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  TACCCGCTCCGCACGTCGCCTCAGTTCCTCGGCCCGCTCGTGGAGGACATGATGCACGCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               GTTGAGCACGAGGAGGAGGTCAAGGTCAAGGACGACGAGGCCATTCTTCGCCAGGACCGC
                                            2100
                                                                         2040
                                                                                                          2040
                                                                                                                                                                                                   1920
                                                                                                                                                                                                                                 1920
                                                                                                                                                                                                                                                              1860
                                                                                                                                                                                                                                                                                           1860
                                                                                                                                                                                                                                                                                                                                                      1800
                                                                                                                                                                                                                                                                                                                                                                                       1740
                                                                                                                                                                                                                                                                                                                                                                                                                  1740
                                                                                                                                                                                                                                                                                                                                                                                                                                                 1680
                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1680
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1620
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1560
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1560
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1500
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1440
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1440
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1380
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1380
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1320
                2100
                                                                                                                                       1980
                                                                                                                                                                                                                                                                                                                          1800
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1320
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1260
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1200
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1200
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1140
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1140
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1080
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1080
S
                             Вb
                                                     Š
                                                                                                                                                      ORIGIN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        D
```

5 B 5 B 5

B 8 B 8

유

유

8 8

Ъ

Б

δ В 5 В 5 В Ş Db. 5 망 5 밁 5 밁 8 B

8

밁

97

CACGCCGCTCCGACCAAGTCGGCTGCGGGCCCCACTTCGGCTCTCCGCCGCACGCCCGGC

```
REFERENCE
AUTHORS
TITLE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             VERSION
KEYWORDS
SOURCE
ORGANISM
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                RESULT 3
AX366876
LOCUS
DEFINITION
ACCESSION
                                                                                                                                                                                                                                                                                                                                                           FEATURES
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     ő
                                                  Query Match
Best Local Similarity
Matches 2312; Conserv
                                                                                                                                                                                                                                                                                                                                                                                      JOURNAL
                                                                                                                  exon
terminator
                                                                                                                                           exon
intron
exon
intron
                                                                                                                                                                                                                                                   exon
intron
                                                                                                                                                                                               exon
intron
                                                                                                                                                                                                                                        exon
                                                                                                                                                                                                                                                                           intron
                                                                                                                                                                                                                        intron
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     2401
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    2161
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             2401
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         2341
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    2281
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        2221
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          2161
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                2101
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         2101
                      37
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                AX366876
Sequence 28
AX366876
ب
                                                                                                                                                                                                                                                                                                                                                                        Yoshida,R.K. and Kootstra,A.B. Phenylalanine ammonia lyase polypeptide sequences and methods of obtaining and vatent: WO 0208402-A 28 31-JAN-2002; PCBU Services, Inc. (US)
                                                                                                                                                                                                                                                                                                                                                                                                                                                               Rhodotorula graminis
Rhodotorula graminis
Eukaryota, Fungi, Basidiomycota, Urediniomycetes,
Microbotryomycetidae, Sporidiobolales, mitosporic
                                                                                                                                                                                                                                                                                                                                                                                                                                                        Rhodotorula.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     AX366876.1 GI:18698164
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               GGCGTGCAGCAGGAGACGATCGGGAGCAACGTCTCGCGCATCTACGAGGCCATCAAGGAC
ATGGCMCCTTCCTTGGACTCGCCACCACCACGCTCGCCAACGGCTTTACCAACGGCTCG
              ATGGCCCCTTCCTTGGACTCGCTCGCCACCACGCTCGCCAACGGCTTTACCAACGGCTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             AGTTCAAAAAAAAAAAAAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                AGTTCAAAAAAAAAAAA 2419
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CCCGCGTCTCCGGTCGTCAGTACACGTGTATAGAGCCTGGAATGGAATGGAATTGCAAGTCTTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CCTCCATACACATGTCGCCTTACTCTCTCGCCGTCATCACGTCTCTCAGTTCTTTCGTAT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        GACGCCGCCTCACCCCAAGACCAGCTTTTCGACGTCGTGTCGTGCCAAGAACGGACTTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            GGCCGCATCAACCACGTCCTCGTCAAGATGCTCGCGTAAGGCCCGAGCAAGCCTCGCCTA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    GGCCGCATCAACCACGTCCTCGTCAAGATGCTCGCGTAAGGCCGAGCAAGCCTCGCCTA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 CCCGCGTCTCTCGGTCACTACACGTGTATAGAGCCTGGAATGGATTGCAAGTCTTCG
                                                    Conservative
                                                                                                                362. .448
439. .960
881. .960
961. .1295
1296. .1364
1365. .1529
1530. .1748
1749. .1788
1749. .1821
1822. .1921
2587. .2586
                                                                                                                                                                                                                                                                                        /organism="Rhodotorula graminis"
/mol_type="unassigned DNA"
/db_xref="taxon:29898"
                                                                                                                                                                                                                                                                                                                                                          Location/Qualifiers
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               from Patent
                                                               75.5%;
                                               Score 1826.6; DB 6;
Pred. No. 7.4e-213;
2; Mismatches 1;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             2419
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               2741 bp
WO0208402.
                                                                                                                                                                                                                                                                                                                                                                                                ptide and p
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            DNA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             linear
                                                                                                                                                                                                                                                                                                                                                                                                                polynucleotide
                                                                            Length
                                                                                                                                                                                                                                                                                                                                                                                                    same
                                                    426;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Sporidiobolales;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             PAT 15-FEB-2002
 60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  2400
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          2400
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    2340
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             2340
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        2280
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 2280
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             2220
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       2220
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 2160
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         2160
                         96
                                                    o
```

4d 4d

541 TCGGTCTCGGTCCTCAGGGTCGAACACGGTTCCGCTCGAGGTCGTC 800 550 CGCGGGCCATGGTCATCGCGTTCAACTAGCTTCAGGGTTCCGCTCGAGGTCGTC 800 610 GTCGTCTTGAGGGGTCACCAACTTCTTGAACCACCGGTCACCCCTC 600 610 GTCGTCCTTGAGGGCTCACCAACTTCTTGAACCACCGGTTCACCCCCTC 600 611 GTCGTCCTTGAGGGCCTCACCAACTTCTTGAACCACCGGTTCACCCCCTC 600 612 GTCGTCCTTGAGGCGTCACCAACTTCTTGAACCACCGCATCAGGCCGATCGTCCCCCTC 600 613 GTCGTCCTTGAGGCGTCACCAACTTCTTGAACCACCGCATCAGGCCGATCGTCCCCCTC 600 614 GTCGTCCTTGAGGCGTCACCAACTTCTTGAACCACCGCATCAGGCCGATCGTCCCCCTC 720 620 GCGGCTCCATCTCGGCGTCACCACCTCTCAGCCCGCATCAGCCCCATCCTCCTACCTCGTACATCGCCGGCCCATC 720 730 ACCGGTCACCCCCACCGTCAACGTTCAACGTTCAGCCCGAACGAA	CACCCCCCCACCAGCCCCAGCCCAGCCCAGCCCAGCCC
A     A     B     A     A     B     A     A <td>p</td>	p
1424 CCGAGGACCCGTCGCTCAACTATCACGGCAAGGGCTTGGACATTCACATCGCTGCTTACG 1483	1141 GCCGCCCGGCACCCCGGCCAAGGTCGAAGGTCGAAGATCCGGCACGCTCCTTTCCGGCT 1200  1070 CGTCGTTTGCCGTTGAGCACGAAGAGAGGAGGAGGACGACGACGACGAGGGCATTCCTTC 1129  1201 CGTCGTTTGCCGTTGAGCACGAGGAGGAGGAGGAGGACGACGACGAGGGCATTCCTTC 1260  1130 GCCAGGACCGCTACCCGCTCCGCACGAGGAGGAGGACGACGAGGGCATTCCTTC 1260  1131 GCCAGGACCGCTACCCGCTCCGCACGTCGGCCTCAAGGTCAAGGTCAAGGTCAAGGTCACCGCTTCCCCTTCC 1320  1151 GCCAGGACCGCTACCCGCTCCGCACGTCGGCCTCAGGTTCGTCCCCTCTCCCCCTTCC 1320  1162

유 성

D 64 D 64

용성

D & D &

당 왕

용 성

g 25

B 8

음 성

δ

용 성

음 성

& B & B & B & B	JOURNAL FEATURES SOURC ORIGIN OULTY ME Best Loc Matches	RESULT 4 AR199606 LOCUS DEFINITION ACCESSION VERSION VERSION KEYWORDS SOURCE ORGANISM REFERENCE AUTHORS	0y 0y 0y 0d	D	8 8 8 8 8 8 8
37 ATGGCCCCTTCCTTGGACTCGCCACCACGCTCGCCAACGGCTTTACCAACGGCTCG 96	1916	4  AR199606  AR199606  ON AR199606  NAR199606  ON AR199606  ON AR199606  ON O	2251 CGACGTCGTGGTGGCAAGAACGGACTTTCCTCCATACACATGTCGCCTTACTCTCTCG 2310	2131 GTCTCGCGCATCTACGAGGCCATCAAGGACGGCCGCATCAACCACGTCCTCGTCAAGATG 2190	1891 GCCAACGTCACCCTTACTGCCGTCAACGCGTGGAAGGTTGCCTCGGCCGAGAAGGCCATC 1950
	· .				
B & B & B & B &	Qy Qy Db Qy	7	B	B & B & 8	B 6 B 6 B 6 B 6 B
1111 GACGACGAGGGATTCTTCGCCAGGACCGCTCGCTCGGCACGTCGCCTCAGTTCCTC 1170	1 TCGCAGGCCTTGACGGCTCTCACGGTGGAGGCCATGGTCGGCCAGGAGGCTCGTTCGCG	751 GTTCACGTTTTGCACGAGGAACCCTGAGAAGATCATGTTTGCGCCGAGGCCATCTCGCTC 810	31 AACTTCTTGAACCACCGCATCACGCCATCGTCCCCTCCGGGGTCCATCTCGGGGTCG 6	1 GGACGCGGCCTCGAGAACACGCTTCCGCTCGAGGTCGTCGCGCGGGGGCCATGGTCATCCGC 57	181 ACCCCACCGNNACGNACGNNNTCGAACTCCACGGGGTACACCCCTCACCCTCGGNGACGACGACGACGACGACGACGACGACGACGACGACGACG

밁

Ś

5 8 5 5

1408 1381 1468

岁

1441

1501

```
ACGTCCTCGTCAAGATGCTCGCGTA-AGGCCCGAGCAAGCCTCGCCTAGACGCCCGCCTC
                                                                                                                                                                                                                                                                                                                                    AGACGATCGGGAGCAACGTCTCCGCGCATCTACGAGGCCATCAAGGACGGCCGCATCAACC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CGGCCGAGAAGGCCATCTCGCTCACGCGCGAGGTGCGCAACCGCTTCTGGCAGACGCCGT 1993
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   NNGTCCTCGCCNNNNGCCANNAGGTCTCGCTCGCNGCCGTCAACGCCTGGAAGGTCGCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         TCGTCCTCGCCCTCTGCCA--ACGTCACCCTTACTGCCGTCAACGCGTGGAAGGTTGCCT 1933
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CCGACTCTCCAGCAGCACCTCGGCACTGGCCTCGACGTC------AACGCA 1755
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CAGGCCGTCGACCTCCGCGCGATGGAGTTCGAGTTCAAGAAGCAGTTCGACCCGNTNNTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               CAGGCCGTCGACCTCCGCGCGATGGAGCTCGACTTCAAGAAGCAGTTCGACCCGCTTCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    ACNGCCGAGGCCAACGACGTCCTTTCTCTCCTCCTCGCCACCCCACCTCTACTGCGTNCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CAGCCGGCNGAGATGGGCAACCAGGCCGTCAACTCGCTCGCNCTCATCTCGGCNCGCCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                GCCGCNGCNGCNTACACTTCGGAGCTCGGNCACCTTGCCAACCCGGTNACGACCCACGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             CACATCGCTGCTTACGCTTCGGAGCTCGGCCACCTTGCCAACCCCGGTCACTACCTTCGTC 1527
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 CONTCCTGCCTGCCGAGGACCCNTCGCTCTCCTATCACTGCAAGGGCCTCGACATT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CCTTCGTGCCTGCCGAGGACCCGTCGCCTCAACTATCACGGCAAGGGCTTGGACATT 1467
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GCCAAGCTCAACTTCACGCAGCTCACCGAGATGCTCAACGCCGGCATGAACCCGCGGCCTN 1380
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                GGCAAGCTCAACTTCACGCAGTGCACCGAGTTGCTCAACGCTGCCATGAACCGCGGCCTG 1407
NGTININCANINACNCNTININININANICNGGNANIGANTINIANGNNTINCGNGNNCININININI
                                                                                                                                                                                                                                                                                                         TGACGATCGGCACCAACGTCTCCCGCATCTACGAGGCCATCAAGNNCGGCNGCATCAACC
                                                                                                                                                                                                                                                                                                                                                                                    TCCGCGAGGAGCTCGGCGTCAAGGCCCGCCGCGGCGACGTCTTCCTCGGCAAGCAGGAGG
                                                                                                                                                                                                                                                                                                                                                                                                                        TGCGCGAGGAGCTCGGCGTGCAGGCGCGCGCGCGACGTGTTTGTCGGCGTGCAGCAGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CCGCCGAGAAGGCCATCTCGCTCACGCGCNANGTCCGCGACNCCTTCTGGNCGGCNCCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CTCGAGCCGCGCTGGCACGACGCCTTCTCGTTCGCGACCGGCACCGTCGTCGAGNNNNNN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CTCGAGCCGCGCTGGCACGACGCCTTCTCGTACGCGACCGGCACCGTCGTCGAGCTCCTC 1875
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ACTGCCGAGGCCAACGACGTCCTTTCTCTCTCTCGCCTCGCACCTGTACTGCACGCTC
                                                                                                                                                    NNNCCNINNNNNNCTNTTNGNINNTCGNNTCNTGNCNNNNNCGGANNTNNCNNCNNNNNNN
                                                                                                                                                                                         ACCCCAAGACCAGCTTTTCGACGTCGTGTCGTGCCAAGAACGGACTTTCCTCCATACACA
                                                                                                                                                                                                                               ACGTCCTCGTCAAGATGCTCGCNTAGNNNCNCNNNCNANNCTCGCNTNNNNNCCNNNCNC
                                                                                                                                                                                                                                                                                                                                                                                                                                                          CGTCGTCGTCGCCCGCGCTCNCGTACCTCTCGCCGCGCACGCGCGTCCTGTACTCGTTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      CTCGNGGACAAGGTCAACAAGNCGCTCNACAAGCGNCTCGAGCAGCAACTCGTACGAC
                                    GGTCGTCA-GTACACGTGTATAGAGCCTGGAATGGATTGCAAGTCTTCGAGTTCAAAAAA
                                                                                                                TGTCGCCTTACTCTCGCCGTCATCACGTCTCTCAGTTCTTTCGTATCCCGCGTCTCTC
                                                                          TNINNCHTNINCTINNCTCHCINNINANCINGTCHNTINNINNCTINNIGHNTHINNINNINCHNINC
  2400
                                                                                                                2352
                                                                                                                                                                                         2292
                                                                                                                                                                                                                                                                                                                                              2173
                                                                                                                                                                                                                                                                                                                                                                                    2100
                                                                                                                                                                                                                                                                                                                                                                                                                      2113
                                                                                                                                                                                                                                                                                                                                                                                                                                                            2040
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 2053
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1980
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1920
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1815
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1740
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1680
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1707
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1620
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1647
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1560
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1440
                                                                                                                                                                                                                                                                     2232
                                                                                                                                                                                                                                                                                                       2160
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1500
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                KEYWORDS
SOURCE
ORGANISM
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         DEFINITION
ACCESSION
VERSION
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               RESULT 5
AX366868
LOCUS
                                                                                                                                                                                                                                                                                                                                                                                                                                                            뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ϋ́
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                유
  밁
                            Ş
                                                                          밁
                                                                                                        Ş
                                                                                                                                                В
                                                                                                                                                                               5
                                                                                                                                                                                                                               日
                                                                                                                                                                                                                                                             Ş
                                                                                                                                                                                                                                                                                                     망
                                                                                                                                                                                                                                                                                                                                          δ
                                                                                                                                                                                                                                                                                                                                                                                  В
                                                                                                                                                                                                                                                                                                                                                                                                              8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ORIGIN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               FEATURES
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              REFERENCE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Query Match
Best Local S
Matches 1878
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        AUTHORS
TITLE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      JOURNAL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               source
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                2401
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  atch 67.3%; cal Similarity 78.0%; 1878; Conservative
                                                                          481
                                                                                                                                                      421
                                                                                                                                                                                         451
                                                                                                                                                                                                                                 361
                                                                                                                                                                                                                                                                     391
                                                                                                                                                                                                                                                                                                           301
                                                                                                                                                                                                                                                                                                                                              331
                                                                                                                                                                                                                                                                                                                                                                                    241
                                                                                                                                                                                                                                                                                                                                                                                                                        272
                                                                                                                                                                                                                                                                                                                                                                                                                                                              181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 215
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           155 GCCTCGATGGCCACGCGCGCACCAGTCGCAGCTCGAGATCGTGCAGGAGCTCCTCAGCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       97
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      37 ATGGCCCCTTCCTTGGACTCGCTCGCCACCACCGCTCGCCAACGGCTTTACCAACGGCTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         AX366868
Sequence 20
AX366868
AX366868.1
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1 ATGGCCCCCTCCNTCGACTCGATCGCGACCTCGNTCGCCAACGGCNTCNCNAACGGNTNG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Phenylalanine ammonia lyase polypeptide and psequences and methods of obtaining and using Patent: WO 0208402-A 20 31-JAN-2002; PCBU Services, Inc. (US)
Location/Qualifiers
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                synthetic construct artificial sequences.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Yoshida, R.K. and Kootstra, A.B.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    synthetic construct
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                NNNANAAA 2408
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    AAAAAAAA 2419
                      GTCAACTCGCTCACGCGTGGCCACTCGGCCGTCGTCGTCGTCGTCGTGAGGCGCTCACC
                                                                                                  GCGCTCATCGAGCACCAGCTCTGCGGCGTGACGCCGACGTCCGYCTCGTCCTTCAGCGTC
                                                                                                                                                                                                                                                       ACCACGGGTTTCGGTGGCTCGGCCGACACGAGGACTGAGGATGCAGTCAGCCTCCAGAAG
                                                                                                                                                                                                                                                                                                           AAGATCGACAANAGNGTCGAGTTCCTCCGNNCNCAGCTCNACAACAGNGTCTACGGNGTC
                                                                                                                                                                                                                                                                                                                                              CGCGTCGACAAGAGCGTCGACTTCCTCAAGGCCCAGCTTCAGAACTCGGTCTACGGAGTC
                                                                                                                                                                                                                                                                                                                                                                                                              TCGGCGCCGCCCGCAAGGGGCGCAGGGTCCGCGTC-CAGAACGACGACGAGATCCGCGCA 330
                                                                                                                                                                                                                                                                                                                                                                                                                                                              ACCCCACCGNNACGNACGNNNTCGAACTCGACGGTACACCCTCACCCTCGGNGACGTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ACCCCACCGAC---GACGTCGAGCTCAGCGGGTACAGCCTCACCGTCGCGTGACGTTG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       GCTCGCTCCTCCCGACCACCCAGNNGACGCAGCTCGACATCGTNGAGNAGATCCTCGCCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   CACGCCGNNCCGNCNNNGNCGNCNACGGGCGCCACGTCCACNCTCNGNCGGCCGNCGCNG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 CACGCCGCTCCGACCAAGTCGGCTGCGGGGCCCCACTTCGGCTCTCCGCCGCACGC--CCG 154
  GTCAACTCGCTCACNCGCGGCCACTCGGCNGTCCGCCTCGTCGTCCTCGAGGCGCTCACC
                                                                            GONCGCGGCCTCGAGAACTCGCTTCCGCTCGAGGTCGTCGCGGCGCCATGACCATCCGC
                                                                                                                                                      ĠĊŊĊŢĊĊŢĊĠĂĠĊĂĊĊĂĠĊŢĊŢĠĊĠĠŢĠŢŊĊŢĊĊŊĂĊĠŢĊĠŊŢĊĠAŊŢĊĊŢŢĊŊĠĊĊŢĊ
                                                                                                                                                                                                                                   ACCACTGGTTTCGGCGGCTCGGCCGACACCCGGACTGAGGATGCNATCTCGCTCCAGAAG
                                                                                                                                                                                                                                                                                                                                                                                    TCGGCGCCGCNCGCAAGGCCCGCNCNGTCCGCGTCNCAGACAGNCGACGAGATCCGCGCA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 /organism="synthetic construct"
/mol_type="unassigned DNA"
/db_xref="taxon;32630"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1. .2475
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     /note="Consensus Sequence of SEQ ID NOs: 12,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             GI:18698157
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 from
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Patent
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Score 1629; DB 6;
Pred. No. 7.5e-189;
1; Mismatches 504;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 2475 bp
WC0208402
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   DNA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     linear
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          polynucleotide
g same
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            2475;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        25;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     PAT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       16,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     15-FEB-2002
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     and
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       18"
                                                                                                                                                                                                                                     420
                                                                                                                                                                                                                                                                         450
                                                                                                                                                                                                                                                                                                                                                  390
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                60
                                          630
                                                                              540
                                                                                                                                                                                             510
                                                                                                                                                                                                                                                                                                                                                                                        300
                                                                                                                                                                                                                                                                                                                                                                                                                                                              240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       271
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               214
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   120
      600
                                                                                                                                                          480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        8
```

Ş

2221

유 상

2101 2174 2161

 유 성 유 성 유 성

1994 1981 2054 2041 A B

1861 1934

Я

1921

유

1681 1756 1741 1816 1801

Ϋ́

1876

> 1588 1561 1648 1621

В

Ş DЪ Ş B Ş 8 8

8 ВĠ

1408 CCTTCGTGCCTGCCGAGGACCCGTCGCTCAACTATCACGGCAAGGCCTTGGACATT 1467	631 AACTICITISAACCACCGAITCACGCCATCCTCCCCCCCCACCTCATCTCCAGCCTCC, 690 601 AACTICCTCCAACCACGCATCACCCCCATCCTCCCCCCCCCC
RESULT 6 E01759 E01759 LOCUS LOCUS LOCUS LOCUS LOCUS DNA encoding L-phenylanine anmonia-lyase. ACCESSION E01759 VERSION E01759 VERSION F01759 VERSION F01759 VERSION F01759 VERSION F01759 VERSION F01759 AUTHORS Rhodosporidium toruloides CRGANISM Rhodosporidium toruloides Eukaryota; Fungi; Basidiomycota; Urediniomycetes; Microbotryomycetidae; Sporidiobolales; Rhodosporidium. REFERENCE AUTHORS Fukuhara, N., Yoshino, S., Yamamoto, K., Nakajima, Y., Iwata, T., Watanabe, M., Suzuki, M. and Makiguchi, N. TITLE STRUCTURAL GENE, NOVEL BASE SEQUENCE CONTAINING SAME, TRANSFORMANT PRODUCED THEREWITH AND PRODUCTION OF L-PHENYLALANINE USING SAME MITSUI TOATSU CHEM INC OS Rhodosporidium toruloides PN JP 1988291583-A/1	Db 1681 NONDOCTONICHAGAGACATTTTGCCCHACAAGCCCCCAGCAGCACGACGACGACGACGTACCACAGACGTACCACAGACGTACCACAGACGTACCACAGACGTACCACAGACGTACCACAGACGTACCACAGACGTACGACGACGTACGACGACGTACGACGACGTACGACGACGTACGACGACGTACGACGACGACGACGACGACGACGACGACGACGACGACGA

Б 8 Ъ Ş В δ Ŗ, Ś В

밁 δÃ 밁 VQ. 멍 Ş 밁 밁

Ś

Ş

Дb

Ş

В 8 В 8 B Ś

704

```
DRIGIN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            FEATURES
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Query Match
Best Local S
Matches 1565
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         source
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     PD 29-NOV-1988

PF 22-NAY-1987 JP 1987123950

PI EUKUHARA NOBUHIRO, YOSHINO SADAO, YAMAMOTO KAORU,
NAKAJIMA YOSHIYUKI,
PI IWATA TOMOYUKI, WATANABE MIDORI, SUZUKI MAKI, PI
NOBUYOSHI
PC C12N9/88,C12N1/16,C12N1/18,C12N1/20,C12N15/00,C11
(C12P13/22,
PC C12R119),(C12P13/22,C12R1:865);
CC strandedness: Double;
CC topology: Linear;
CC topology: Linear;
CC topology: Linear;
CC source: No;
CC anti-sense: No;
CC *source: Strain=IFO 559;
CC *source: clone-pSW101;
FH Key
FH Key

FT CDS

Pyroduct='L-phenylananine anmonia-1

FT CDS

Pyroduct='L-phenylanine anmonia-1

FT LOSETION/Onalification
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              105
                                                                                                                                                                        465
                                                                                                                                                                                                                                                                                                             345
                                                                                                                                                                                                                                                                                                                                              399
                                                                                                                                                                                                                                                                                                                                                                                   285
                                                                                                                                                                                                                                                                                                                                                                                                                  339
                                                                                                                                                                                                                                                                                                                                                                                                                                                     225
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      279
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       165
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         219
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               159
699
                                                                 639
                                                                                                    525
                                                                                                                                   579
                                                                                                                                                                                                         519
                                                                                                                                                                                                                                            405
                                                                                                                                                                                                                                                                            459
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                45
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   99
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Similarity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       GACCGACTCGAACTCGAACTCGACGCTACTCGCTCAACCTCGGAGACGTCGTCTCGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        GCACCTGCCCACAACCCAGGTCACGCAGGTCGACATCGTCGAGAAGATGCTCGCCGCGCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               CGATGGCCACGCCGCACCAGTCGCAGCTCCGAGATCGTGCAGGAGCTCCTCAGCGACCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CGTCGCATCCGCAAAGCAGGCTGTCAATGGCGCCTCGACCAACCTCGCAGTCGCAGGCTC
                                                                                                                                                                                                                                                              CGAGCACCAGCTCTGCGGCGTGACGCCGACGTCCGYCTCGTCCTTCAGCGTCGACGCGG
                                                                                                                                                                                                                                                                                                             ATTTGGCGGATCCGCAGACACCCGCACCGAGGGACGCCATCTCGCTCCAGAAGGCTCTCCT
                                                                                                                                                                                                                                                                                                                                                                                                                    CAAGAGCGTCGACTTCCTCAAGGCCCAGCTTCAGAACTCGGTCTACGGAGTCACCACGGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                       CGCGAGGAAGGGCAGGCCTGTCCGCGTCAAGGACAGCGACGAGATCCGCTCAAAGATTGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CAGCCCGCTCTCGTACATCGCCGGCCCCATCACCGGTCACCCCGACGTCAAGGTTCACGT
                                                 GAACCACCGCATCACGCCCATCGCCCCTCCGCGGCTCCATCTCGGCGTCGAGCGACCT
                                                                                                                                     GCTCACGCGTGGCCACTCGGCCGTCGTCGTCGTCCTTGAGGCGCTCACCAACTTCTT
                                                                                                                                                                                                       CCTCGAGAACACGCTTCCGCTCGAGGTCGTCCGCGCGCCATGGTCATCCGCGTCAACTC
                                                                                                                                                                                                                                            CGAGCACCAGCTCTGCGGTGTTCTCCCTTCGTCGTTCGACTCGTTCCGCCTCGGCCGCGG
                                                                                                                                                                                                                                                                                                                                             TTTCGGTGGCTCGGCCGACACGAGGACTGAGGATGCAGTCAGCCTCCAGAAGGCGCTCAT
                                                                                                                                                                                                                                                                                                                                                                                   CAAATCGGTCGAGTTCTTGCGCTCGCAACTCTCCATGAGCGTCTACGGCGTCACGACTGG
                                                                                                      CTTGACCCGCGGCCACTCGGCTGTCCGCCTCGTCCTCGAGGCGCTCACCAACTTCCT
                                                                                                                                                                      TCTCGAGAACTCGCTTCCCCTCGAGGTTGTTCGCGGCGCCATGACAATCCGCGTCAACAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 29-NOV-1988
22-MAY-1987 JF 1987123950
FUKUHARA NOBUHIRO, YOSHINO SADAO, YAMAMOTO KAORU,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      C12N9/88, C12N1/16, C12N1/18, C12N1/20, C12N15/00, C12P13/22,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  /product='L-phenylanine
Location/Qualifiers
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    /organism="Rhodosporidium
/mol_type="genomic RNA"
/db_xref="taxon:5286"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                49.5%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           /product='L-phenylananine anmonia-lyase' .2148
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Score 1196.6; DB 6;
Pred. No. 2.5e-136;
1; Mismatches 525;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         toruloides'
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              anmonia-lyase
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      2151
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           PI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  24;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            ΡÏ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           MAKIGUCHI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        ğ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 月日
                                                                                                                                                                                                                                                                                                                                                                                                                    398
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        338
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               218
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                104
                                                                   869
                                                                                                      584
                                                                                                                                       638
                                                                                                                                                                                                           578
                                                                                                                                                                                                                                             464
                                                                                                                                                                                                                                                                              518
                                                                                                                                                                                                                                                                                                                 404
                                                                                                                                                                                                                                                                                                                                                458
                                                                                                                                                                                                                                                                                                                                                                                   344
                                                                                                                                                                                                                                                                                                                                                                                                                                                       284
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         224
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              164
 758
                                  644
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          뮍
                  S
                                                   밁
                                                                              8
                                                                                                                      밁
                                                                                                                                                      Ś
                                                                                                                                                                                        밁
                                                                                                                                                                                                                      8
                                                                                                                                                                                                                                                              뭥
                                                                                                                                                                                                                                                                                      Ϋ́
                                                                                                                                                                                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                                                                                             S
                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                             5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               뭐
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    片
                                                                                                                                                                                                                                                                1485
                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1305
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1125
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1065
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1119
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1005
                                                                                                                        1605
                                                                                                                                                                                          1545
                                                                                                                                                                                                                           1596
                                                                                                                                                                                                                                                                                                                                  1425
                                                                                                                                                                                                                                                                                                                                                                    1476
                                                                                                                                                                                                                                                                                                                                                                                                     1365
                                                                                                                                                                                                                                                                                                                                                                                                                                    1416
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1356
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1245
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1296
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1236
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1059
                                                                                      1716
                                                                                                                                                                                                                                                                                               1536
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            645
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             945
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              999
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               885
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  939
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     825
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       765
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        819
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        705
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         759
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CTCTCTCTCTCTACATTGCAGCGGCCATCAGCGGTCACCCGGACAGCAAGGTGCACGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            TCACGACGTCACGCGCCCTCACCCGACGCAGATCGAAGTCGCGGGAAACATCCGCAAGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 GCTCACGGCCATGACGGTCGAAGCGATGGTCGGCCACGCCGGCTCGTTCCACCCCCTTCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CTTGACGGCTCTCACGGTGGAGGCCATGGTCGGCCAGCAGGGCTCGTTCGCGCCGTTCAT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CGCCTCGATGGCGACCCTCAGTCTGCACGACTCGCACATGCTCTCGCTCCTCTCGCAGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CGAGGCAGTCGTCCTCGGCCCGAAGGACGGTCTCGGTCTGGTCAACGGAACGGCCGTCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CGTCCACGAGGGCAAGGAGAAGATCCTGTACGCCCGCGAGGCGATGGCGCTCTTCAACCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  TTTGCACGAGGGAAACATCATGTTTGCGCGCGAGGCCATCTCGCTCTTTGGTCT
CGAGGTCAAGAAGGCGCTCAACAAGCGTCTCGAGCAGACGACGACGTACGACCTCGAGCC
                                                                                                                                                                                                            GGCCAACGACGTCCTTCTCCCTTCTCGCCTCGCACCTGTACTGCACGCTCCAGGCCGT
                                                                                                                                                                                                                                                                                      AGAGATGGGCAACCAGGCCGTCAACTCGCTCGCTCATCTCCGCCGCGCCCCCACTGCCGA
                                                                                                                                                                                                                                                                                                                                                        TGCTTACGCTTCGGAGCTCGGCCACCTTGCCAACCCGGTCACTACCTTCGTCCAGCCCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                    CCTCGCTGCCGAGGACCCGTCGCTCAACTATCACGGCAAGGGCTTGGACATTCACATCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               TGCCGCTGTGGCCAACACCATGGAGAAGACTCGCCTCGGGCTCGCCCAGATCGGCAAGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GTCGGCTGTCTCGATTTCGATGGAGAAGACCAGGCTCGCACTCGCCCTCATCGGCAAGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CGACAACCCTCTCATCGACGTCGAGAACAAGACTTCGCACCACGGCGGCAATTTCCAGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CGACAACCCGCTCCTCGACGTCGAGAACAAGCAGACCGCGCACGGCGCAACTTCCAGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ceregaecarcarearecacectacreserrererecerecaeacaacaaca---ceaecaac
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    GGGCATTCTCCGCCAGGACCGCTACCCCTTGCGCACGTCTCCTCAGTGGCTCGGCCCGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GGGCATTCTTCGCCAGGACCGCTACCCGCTCCGCACGTCGCCTCAGTTCCTCGGCCCGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CCTCGAGGGAAGCCGCTTTGCTGCCACCATGAGGAGGAGGTCAAGGTCAAGGACGACGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            ccaceacercreccecceccaceccaeccaeccaeerceaeercececaeaearcececaeeer
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     AGCATCGATGGCCACCTCTGCACGACGCACACATGCTCTCGCTCCTCGCAGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        ceaeccercercerceecceaaecaaaecrerceercreaceacaaceccercre
                                                                                    ccrccaecaecaccrceecacreeccrceacerca------
                                                                                                                      CGACTTGCGCGCGATCGAGTTCGAGTTCAAGAAGCAGTTCGGCCCCAGCCATCGTCTCGCT
                                                                                                                                                           CGACCTCCGCGCGATGGAGCTCGACTTCAAGAAGCAGTTCGACCCGCTTCTCCCGACTCT
                                                                                                                                                                                          GTCCAACGACGTCCTTTCTCTCCTCCTCGCCACCCACCTCTACTGCGTTCTCCAAGCCAT
                                                                                                                                                                                                                                                                TGAGATGGCGAACCAGGCGGTCAACTCGCTTGCGCTCATCTCGGCTCGTCGCACGACCGA
                                                                                                                                                                                                                                                                                                                                  GGCGTACACCTCGGAGTTGGGACACCTCGCCAACCCTGTGACGACGCATGTCCAGCCGGC
                                                                                                                                                                                                                                                                                                                                                                                                       COTOGOGGOCGAAGACCCCTCGCTCCCTACCACTGCAAGGGCCTCGACATCGCCGCTGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CGTCAGCGÁCCTCÁTTCÁCGCCCÁCGCCGTCCTCACCATCGÁGGCCGGCCAGTCGÁCGÁC
                                                   CATCGÁCCAGCACTTTGGCTCCGCCATGACCGGCTCGAACCTGCGCGACGAGCTCGTCGA
                                                                                         ACCCACTTGCGCT
```

1235

1295 1184

1244

1355

1304

1178

1124

1058

944

1004

998 884 938 824 878 764 818

뮍 Ś B

1655 1544 1595 1484 1535 1424 1475 1364

1823 1724 1664 1715 1604

S 맑 20 ઠ δ 밁 Ş 망 Ş 밁 Ş 밁 ž 밁 Š 용 Š

Ş

Query Match  49.5%; Score 1196.6; DB 6; Length 2151;  Best Local Similarity 74.0%; Pred. No. 2.5e-136;  Matches 1565; Conservative 1; Mismatches 525; Indels 24; Gaps 3;  Qy 99 CGCCGCTCCGACCAAGTCGGCTGCACCTTCGGCTCTCCGCCGACGCCCTC 158	DEFINITION Sequence 9 from patent US 6368837.  ACCESSION AR205032 VERSION AR205032.1 GI:21502510  KEYWORDS SOURCE Unknown. ORGANISM Unclassified.  TITLE Hopen to 2151) AUTHORS Gatenby, A.A., Sariaslani, S., Tang, XS., Qi, W.Wei. and Vannelli, T. TITLE Bioproduction of para-hydroxycinnamic acid JOURNAL Patent: US 6368837 A. 99-APR-2002; FEATURES Location/Qualifiers Source //organism="unaksown" /mol_type="unaksigned DNA"	Qy 2184 CAAGATGCTCGCGTA 2198	Qy       2064       GCTCGGCGTGCAGCGCCGCGCGCGACGTGTTGTCGCGTGCAGCAGGAGACGATCGG       2123		Qy 1884 GCCCTCTGCCAACGTCACCCTTACTGCCGTCAACGCGTGGAAGGTTGCCTCGGCCGAGAA 1943	Db 1725 GAAGGTGAACAAGACGCTCGCCAAGCGCCTCGAGCAGCCAACTCGTACGACCTCGTCCC 1784  Qy 1824 GCGCTGGCACGCCTTCTCGTACGCGACCGGCACCGTCGTCGTACGTCCTCGTCGTCGTCGTCGTCGTCGTCGTCGTCGTCGTC
8 8 8 8 8 8 8 8 8 8 8 8	7	0	Db Db	Db Oy	Q D Qy	Db Oy
1119 GGCAPTCTTCGCCAGGACGGCTACCGCTCGCACTCGCCACTCACT	GGCCTCGATGGCGACCCTCAGTCTGCACGACTCGCACATGCTCTCGCTCG	759 TITGCACGAGGAACCGAGAAGATCATGTTTGCGCGCGAGGCCATCTCGCTCTTTGGTCT 818	639 GAACCACCGCATCACGCCCATCGTCCCCCTCCGCGGCTCCATCTCGGGGTGGGCGACCT 698	465 Teredadaherederreteenderretrededateareaheededahea 524 579 Geteadaheredecaetegecetegecetegecettgagegegeteaetaaettett 638 579 Geteadegetggecaeteggeceteggetettgagegegeteaetaaettett 638 579 Geteadegetggecaeteggeceteggetettaaggegeteaetaaettett 584 525 ettgagegetaeteggetetteggetettgagetgeteaetaaettget 584	459 CGAGCACCAGCTCTGCGGCGTGACGCCGACGTCCGYCTCCTCAGCGTCGGACGCGG 518	285 CAAATCGGTCGAGTTCTTGCGCTCGCAACTCTCCATGAGCGTCTACGGCGTCACGACTGG 344 399 TTTCGGTGGCTCGGCCGACACGAGGACTGAGGATGCAGTCAGCCTCCAGAAGGCGCTCAT 458

밁 Ϋ́

Ş

```
REFERENCE
AUTHORS
TITLE
                                                                                                                                                                                                                              DEFINITION
ACCESSION
VERSION
KEYWORDS
SOURCE
ORGANISM
                                                                                                                                                                                                                                                                                                                                                                                           RESULT 8
AR282639
                                                                      FEATURES
                                                                                           JOURNAL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            2136
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   2076
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              2124
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          2016
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1956
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 2004
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1896
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1944
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1845
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1884
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1785
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1824
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1764
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1665
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1605
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1545
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1596
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1485
                                                                                                                                                                                                                                                                                                                          AR282639
Sequence 9 :
AR282639
                                                                                                                                       1 (bases 1 to 2151)
Tang, X.-S.
Polynucleotide encoding
                                                                                                                                                                                                                                   Unknown.
Unknown.
                                                                                                                                                                                                                                                                                                       AR282639.1
                                                                                                                                                                                                           Unclassified.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CAAGATGCTCGCGTA 2198
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           GAGCAACGTCTCGCGCATCTACGAGGCCCATCAAGGACGCCGCATCAACCACGTCCTCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GCTCGGCGTGCAGGCGCCGCGGCGACGTGTTTGTCGGCGTGCAGCAGGAGACGATCGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   GCCCGCGCTCTCGTACCTCTCGCCGCGCACTCAGATCCTCTACGCCTTCGTCCGCGAGGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             ĠĠĊĊĂŤĊĬĊĠĊĬĊĂĊĊĊĠĊĊĂAĠĬĊĊĠĊĠĂĠĄĊĊĬĬĊĬĠĠŢĊĠĊĊĠĬĊĠĄĊĊĬĊĠĬĊ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        GGCCATCTCGCTCACGCGCGAGGTGCGCAACCGCTTCTGGCAGACGCCGTCTTCGCAGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 GCCCTCTGCCAACGTCACCCTTACTGCCGTCAACGCGTGGAAGGTTGCCTCGGCCGAGAA 1943
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          GCGCTGGCACGACGCCTTCTCGTACGCGACCGGCACCGTCGTCGTCGAGCTCCTCCTCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GAAGGTGAACAAGACGCTCGCCAAGCGCCTCGAGCAGACCAACTCGTACGACCTCGTCCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      CGAGGTCAAGAAGGCGCTCAACAAGCGTCTCGAGCAGGACGACGACGACGACCTCGAGCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CATCGACCAGCACTTTGGCTCCGCCATGACCGGCTCGAACCTGCGCGACGAGCTCGTCGA 1724
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CCTCCAGCAGCACCTCGGCACTGGCCTCGACGTCA------ACGCACTTGCGCT 1763
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   CGACCTCCGCGCGATGGAGCTCGACTTCAAGAAGCAGTTCGACCCGCTTCTCCCGACTCT 1715
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   GTCCAACGACGTCCTTTCTCCTCCTCGCCACCCACCTCTACTGCGTTCTCCAAGCCAT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GGCCAACGACGTCCTTTCTCTCTCTCTCGCCTCGCACCTGTACTGCACGCTCCAGGCCGT 1655
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             TGAGATGGCGAACCAGGCGGTCAACTCGCTTGCGCTCATCTCGGCTCGTCGCACGACCGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 GCGTACACCTCGGAGTTGGGACACCTCGCCAACCCTGTGACGACGCATGTCCAGCCGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CAAGATGCTCGCTTA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   CTCGAACGTCTCCAAGATCTACGAGGCCATCAAGTCGGGCAGGATCAACAACGTCCTCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            gccegcgcacecaraccrcrceccececacececerccreracrcerrerrececeaega
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      GTC-----GCTCTCGCTCGCCGCCGTCAACGCCTGGAAGGTCGCCGCCGCCGAGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                GCGCTGGCACGACGCCTTCTCCTTCGCCGCCGCCACGTCGTCGAGGTCCTCTCGTCGAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CGACTTGCGCGCGACCGAGTTCGAGTTCAAGAAGCAGTTCGGCCCAGCCATCGTCTCGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          AGAGATGGGCAACCAGGCCGCTCAGCTCGCTCTCATCTCCGCGCGCCCACTGCCGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      TGCTTACGCTTCGGAGCCTCGGCCAACCCTTGCCAACCCTACCTTCGTCCAGCCCGC
                                                                                         lyase polypeptide
US 6521748-A 9 18-FEB-2003;
  /organism="unknown"
/mol_type="genomic
                                                                 Location/Qualifiers
                                                                                                                                                                                                                                                                                                                                             2151 bp
from patent US 6521748
                                                                                                                                                                                                                                                                                                         ជ្ជ
_type="genomic
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         2150
                                                                                                                                         ն
                                                                                                                                         mutant Rhodotorula
    DNA"
                                                                                                                                                                                                                                                                                                                                                                        DNA
                                                                                                                                                                                                                                                                                                                                                                          linear
                                                                                                                                         glutinis
                                                                                                                                                                                                                                                                                                                                                                          PAT 10-APR-2003
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   2135
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              2183
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     2123
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   2015
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 2063
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1955
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1844
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1883
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1784
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1823
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1604
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1544
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1484
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1535
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          2075
                                                                                                                                                                                                                         8
                                                                                                                                                                                                                                                                              뭥
                                                                                                                                                                                                                                                                                                                   Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         S
    밁
                                    8
                                                                                           뭐
                                                                                                                                5
                                                                                                                                                                                       뮍
                                                                                                                                                                                                                                                                                                                                                                     멍
                                                                                                                                                                                                                                                                                                                                                                                                              Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        ORIGIN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Query Match
Best Local Similarity
Matches 1565; Conserv
                                                1059
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        345
                                                                                                                                                                                                                                                                                 825
                                                                                                                                                                                                                                                                                                                                                                                                                   819
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             645
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       585
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                639
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                525
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            579
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          465
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   519
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 405
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               339
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             225
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         279
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    165
                                                                                                                                                                                       885
                                                                                                                                                                                                                                                                                                                                                                          765
                                                                                                                                                                                                                                                                                                                                                                                                                                                                 705
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             759
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         699
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            459
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   399
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    285
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              105
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       4.
5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   99
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CAACCACGGCATCACCCCATCGTCCCCCTCCGCGGCACCATCTCTGCGTCGGGCGACCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                GAACCACCGCATCACGCCCATCGTCCCCCCTCCGCGCCTCCATCTCGGCGTCGGGCGACCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CCTCGAGAACACGCTTCCGCTCGAGGTCGTCGCGGCGCCATGGTCATCCGCGTCAACTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      GACCGACTCGACGCTCGAACTCGACGGCTACTCGCTCAACCTCGGAGACGTCGTCTCGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CGATGGCCACGCGCGCACCAGTCGCAGCTCGAGATCGTGCAGGAGCTCCTCAGCGACCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CGCCGCTCCGACCAAGTCGGCTGCGGGCCCCACTTCGGCTCTCCGCCGCACGCCCGGCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                               CGTCCACGAGGGCAAGGAGAAGATCCTGTACGCCCGCGAGGCGATGGCGCTCTTCAACCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           GCTCACGCGTGGCCACTCGGCCGTCCGTCGTCGTTCGAGGGCGCTCACCAACTTCTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       TCTCGAGAACTCGCTTCCCCTCGAGGTTGTTCGCGGCGCCATGACAATCCGCGTCAACAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CAAGAGCGTCGACTTCCTCAAGGCCCAGCTTCAGAACTCGGTCTACGGAGTCACCACGGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CACCGACGACGTCGTCGAGCTCAGCGGGTACAGCCTTCACCGTTGCGTTGTCGGCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GCACCTGCCCACAACCCAGGTCACGCAGGTCGACATCGTCGAGAAGATGCTCGCCGCGCG
       corogagegaagececriticorerecaceargageaegaegreaagereaageaegaegaega
                             CCTTTCCGGCTCGTCGTTTGCCGTTGAGCACGAGGAGGAGGAGGTCAAGGTCAAGGACGACGA
                                                                                           TCACGACGTCACGCCCTCACCCGACGCAGATCGAAGTCGCGGGAAACATCCGCAAGCT
                                                                                                                                    CCACGACGTCTGCCGCCCGCACCCCGGCCAGGTCGAGGTCGCGCCAACATCCGCACGCT
                                                                                                                                                                                          GCTCACGGCCATGACGGTCGAAGCGATGGTCGGCCACGCCGGCTCGTTCCACCCCTTCCT
                                                                                                                                                                                                                                   CGCCTCGATGGCGACCCTCAGTCTGCACGACTCGCCACATGCTCTCGCTCCTCTCGCAGGC
                                                                                                                                                                                                                                                                                                                                                                        CGAGCCCGTCGTCCTCGGCCCGAAGGAGGGTCTCGGTCTAACGGCACCGCCGTCTC
                                                                                                                                                                                                                                                                                                                                                                                                  CGAGGCAGTCGTCCTCGGCCCGAAGGAGGGTCTCGGTCTGGTCAACGGAACGGCCGTCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 TTTGCACGAGGGAACCGAGAAGATCATGTTTGCGCGCGAGGCCATCTCGCTCTTTGGTCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             CTCTCCTCTCCTACATTGCAGCGGCCATCAGCGGTCACCCGGACAGCAAGGTGCACGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             CAGCCCGCTCTCGTACATCGCCGGCCCATCACCGGTCACCCCGACGTCAAGGTTCACGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CTTGACCCGCGCCACTCGGCTGTCCGCCTCGTCGTCGAGGCGCTCACCAACTTCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              ceaecaccacciceción en contra co
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CGAGCACCAGCTCTGCGCGTGACGCCGACGTCCTCCTTCAGCGTCGGACGCGCGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          ATTTGGCGGATCCGCAGACACCCGCACCGAGGACGCCATCTCGCTCCAGAAGGCTCTCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      TTTCGGTGGCTCGGCCGACACGAGGACTGAGGATGCAGTCAGCCTCCAGAAGGCGCTCAT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 CAMATCGGTCGAGTTCTTGCGCTCGCAACTCTCCATGAGCGTCTACGGCGTCACGACTGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        ĊĠĊĠĄĠĠĄĄĠĠĠĊĄĠĠĊĊŦĠŤĊĊĠĊĠŤĊĄĄĠĠĄĊĄĠĊĠĄĊĠĄĠĄŤĊĊĠĊŦĊĄĄĄĠĄŤŦĠĄ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CGTCGCATCCGCAAAGCAGGCTGTCAATGGCGCCTCGACCAACCTCGCAGTCGCAGGCTC
                                                                                                                                                                                                                                                                                   AGCATCGATGGCCACCCTCGCTCTGCACGACGCACACATGCTCTCGCTCCTCTCGCAGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 49.5%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Score 1196.6; DB 6; Length: Pred. No. 2.5e-136; 1; Mismatches 525; Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              2151
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              24;
                                                  1118
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        458
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           338
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     158
                                                                                                1004
                                                                                                                                                                                                                                                                                                                                                                                                                        878
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  818
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              638
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          524
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     578
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               518
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            404
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               398
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             284
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      224
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                164
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           218
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         104
         1064
                                                                                                                                                                                                                                                                                                                                                                                                                                                                      764
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       644
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     869
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   584
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   464
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      344
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  278
                                                                                                                                                                                            944
                                                                                                                                                                                                                                     998
                                                                                                                                                                                                                                                                                   884
                                                                                                                                                                                                                                                                                                                            938
                                                                                                                                                                                                                                                                                                                                                                          824
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             704
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           758
```

¥

አ ¥ 片

Ä 岁

rocus

λĈ g Š 밁 Š 망 å Ŋ

Š

Ŕ 밁 Ş 밁

岁 Ķ

Ş

2198

```
2124
                                                                                                 1956
                                                                                                                                                   1896
                                                                                                                                                                                                   1845
                                                                                                                                                                                                                            1884
                                                                                                                                                                                                                                                      1785
                                                                                                                                                                                                                                                                                                      1725
                                                                                                                                                                                                                                                                                                                               1764
                                                                                                                                                                                                                                                                                                                                                       1665
                                                                                                                                                                                                                                                                                                                                                                                                        1605
                                                                                                                         2004
                                                                                                                                                                         1944
                                                                                                                                                                                                                                                                             1824
                                                                                                                                                                                                                                                                                                                                                                                                                                1656
                                                                                                                                                                                                                                                                                                                                                                                                                                                        1545
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1596
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1485
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1425
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1476
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1365
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1416
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1305
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1356
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1296
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1185
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1125
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1536
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1245
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1065
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1119
                                                                CTTCGGCGTGCAGGGCGCGCCGCGGCGACGTGTTTGTCGGCGTGCAGCAGGAGACACTGATCGG
                                                                                                                                                                                                                GCCCTCTGCCAACGTCACCCTTACTGCCGTCAACGCGTGGAAGGTTGCCTCGGCCGAGAA
                                                                                                                                                                                                                                                                    GCGCTGGCACGACGCCTTCTCGTACGCGACCGGCACCGTCGTCGAGCTCCTCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                          CGACCTCCGCGACTGGAGCTCGACTTCAAGAAGCAGTTCGACCCCTTCTCCGACTCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                        GGCCAACGACGTCCTTTCTCCTCCTCCTCCCCCCGCACCTGTACTGCACGCTCCAGGCCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CCTCGCTGCCGAGGACCCCGTCGCCTCAACTATCACGGCAAGGGCTTGGACATTCACATCGC
CTCGAACGTCTCCAAGATCTACGAGGCCATCAAGTCGGGCAGGATCAACAACGTCCTCCT
                      GAGCAACGTCTCGCGCATCTACGAGGCCATCAAGGACGGCCGCATCAACCACGTCCTCGT
                                                                                                 GCCCGCGCTCTCGTACCTCTCGCCGCGCACTCAGATCCTCTACGCCTTCGTCCGCGAGGA
                                                                                                                         GGCCATCTCGCTCACCCGCCAAGTCCGCGAGACCTTCTGGTCCGCCGCGTCGACCTCGTC
                                                                                                                                                                         GTC-----
                                                                                                                                                                                                                                                      GCGCTGGCACGACGCCTTCTCCTTCGCCGCCGGCACCGTCGTCGAGGTCCTCTCGTCGAC
                                                                                                                                                                                                                                                                                                      GAAGGTGAACAAGACGCTCGCCAAGCGCCTCGAGCAGACCAACTCGTACGACCTCGTCCC
                                                                                                                                                                                                                                                                                                                              CGAGGTCAAGAAGGCGCTCAACAAGCGTCTCGAGCAGGACGACGACGTACGACCTCGAGCC
                                                                                                                                                                                                                                                                                                                                                       CATCGACCAGCACTTTGGCTCCGCCATGACCGGCTCGAACCTGCGCGACGAGCTCGTCGA
                                                                                                                                                                                                                                                                                                                                                                              ccrccaecaecaccrceecacreeccrceacerca-----acecacrrececr
                                                                                                                                                                                                                                                                                                                                                                                                                                                         GTCCAACGACGTCCTTTCTCTCCTCCTCGCCACCCACCTCTACTGCGTTCTCCAAGCCAT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         TGCTTACGCTTCGGAGCTCGGCCACCTTGCCAACCCGGTCACTACCTTCGTCCAGCCCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              TGCCGCTGTGGCCAACACCATGGAGAAGACTCGCCTCGGGCTCGCCCAGATCGGCAAGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      GTCGGCTGTCTCGATTCGATGGAGAGAGACCAGGCTCGCACTCGCCCTCATCGGCAAGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CGACAACCCGCTCCTCGACGTCGAGAACAAGCAGACCGCGCACGGCGGCAACTTCCAGGC 1295
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    GGGCATTCTCCGCCAGGACCGCTACCCCTTGCGCACGTCTCCTCAGTGGCTCGGCCCGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 GGGCATTCTTCGCCAGGACCGCTACCCGCTCCGCACGTCGCCTCAGTTCCTCGGCCCGCT
                                                 CGACTTGCGCGCGACCGAGTTCGAGTTCAAGAAGCAGTTCGGCCCAGCCATCGTCTCGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 GGCGTACACCTCGGAGTTGGGACACCTCGCCAACCCTGTGACGACGCATGTCCAGCCGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CCTCGCGGCCGAAGACCCCCTCGCTCTCCTACCACTGCAAGGGCCTCGACATCGCCGCTGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CGACAACCCTCTCATCGACGTCGAGAACAAGACTTCGCACCACGGCGGCAATTTCCAGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 -GCTCTCGCTCGCCGCCGTCAACGCCTGGAAGGTCGCCGCCGCCGAGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           -CGACGAC
2135
                        2183
                                                 2075
                                                                        2123
                                                                                                 2015
                                                                                                                         2063
                                                                                                                                                   1955
                                                                                                                                                                         2003
                                                                                                                                                                                                   1895
                                                                                                                                                                                                                                                   1844
                                                                                                                                                                                                                                                                             1883
                                                                                                                                                                                                                                                                                                      1784
                                                                                                                                                                                                                                                                                                                               1823
                                                                                                                                                                                                                                                                                                                                                       1724
                                                                                                                                                                                                                                                                                                                                                                                                        1664
                                                                                                                                                                                                                                                                                                                                                                                                                                1715
                                                                                                                                                                                                                                                                                                                                                                                                                                                          1604
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1655
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1544
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1484
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1535
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1424
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1475
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1364
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1415
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1304
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1355
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1184
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1235
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1124
                                                                                                                                                                                                                            1943
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1244
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       REFERENCE
AUTHORS
TITLE
JOURNAL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     VERSION
KEYWORDS
SOURCE
ORGANISM
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        RESULT 9
AX082544
LOCUS
DEFINITION
ACCESSION
                                 Ś
                                                                                                                                                                                                                                                               망
                                                                                                                                                                                                                                                                                                                                         Ś
                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                     멍
          밁
                                                            밁
                                                                                5
                                                                                                             밁
                                                                                                                                    Š
                                                                                                                                                             밁
                                                                                                                                                                                    8
                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                  δ
                                                                                                                                                                                                                                                                                      Ş
                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                            S
                                                                                                                                                                                                                                                                                                                                                                                                                                          Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        ORIGIN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    FEATURES
source
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                유
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Query Match
Best Local S
Matches 1565
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                2136
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       2184
                                                             525
                                                                                    579
                                                                                                                                                                                                              345
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1565;
             585
                                                                                                             465
                                                                                                                                     519
                                                                                                                                                             405
                                                                                                                                                                                      459
                                                                                                                                                                                                                                       399
                                                                                                                                                                                                                                                                285
                                                                                                                                                                                                                                                                                         339
                                                                                                                                                                                                                                                                                                                  225
                                                                                                                                                                                                                                                                                                                                           279
                                                                                                                                                                                                                                                                                                                                                                    165
                                                                                                                                                                                                                                                                                                                                                                                            219
                                                                                                                                                                                                                                                                                                                                                                                                                     105
                                                                                                                                                                                                                                                                                                                                                                                                                                             159
                                                                                                                                                                                                                                                                                                                                                                                                                                                                     4,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             99
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        synthetic
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                AX082544
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CAAGATGCTCGCGTA
```

Ş

Д

밁

망

δ 뮍 Ş 밁 Ś Д 8 밁 Ş В Ş 멍 δÕ 뮍 5 DЬ S

음 성 음 성

Ś

699

CAGCCCGCTCTCGTACATCGCCGGCGCCATCACCGGTCACCCCGACGTCAAGGTTCACGT

```
Sequence 9 .
AX082544
AX082544.1
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Tang,X.S., Vannelli,T.M., Qi,W.W., Sariaslani,S. Bioproduction of para-hydroxycinnamic acid Patent: WO 011071-A 9 15-FEB-2001; E.I. DU PONT DE NEMOURS & COMPANY INCORPORATED (CE.I. DU PONT DE NEMOURS )
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     synthetic construct
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  artificial
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Similarity
CAACCACGGCATCACCCCCATCGTCCCCCTCCGCGCACCATCTCTGCGTCGGGCGACCT
                                GAACCACCGCATCACGCCCATCGTCCCCCCTCCGCGGCTCCATCTCGGGCGTCGGGCACCT
                                                                                                                                                                                                                                                                                CCTCGAGAACACGCTTCCGCTCGAGGTCGTCGCCGCGGCGCCATGGTCATCCGCGTCAACTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CTTGACCCGCGGCCACTCGGCTGTCCGCCTCGTCGTCGAGGCGCTCACCAACTTCCT
                                                                                                                                                                           GCTCACGCGTGGCCACTCGGCCGTCGCCTCGTCGTCCTTGAGGCGCTCACCAACTTCTT
                                                                                                                                                                                                                                            TCTCGAGAACTCGCTTCCCCTCGAGGTTGTTCGCGGCGCCATGACAATCCGCGTCAACAG
                                                                                                                                                                                                                                                                                                                                                              CGAGCACCAGCTCTGCGGTGTTCTCCCTTCGTCGTTCGACTCGTTCCGCCTCGGCCGCGG
                                                                                                                                                                                                                                                                                                                                                                                                    CGAGCACCAGCTCTGCGGCGTGACGCCGACGTCCGYCTCGTCCTTCAGCGTCGGACGCGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         ATTTGGCGGATCCGCAGACACCCGCACCGAGGACGCCATCTCGCTCCAGAAGGCTCTCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         TTTCGGTGGCTCGGCCGACACGAGGACTGAGGATGCAGTCAGCCTCCAGAAGGCGCTCAT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             CAAATCGGTCGAGTTCTTGCGCTCGCAACTCTCCATGAGCGTCTACGGCGTCACGACTGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CAAGAGCGTCGACTTCCTCAAGGCCCAGCTTCAGAACTCGGTCTACGGAGTCACCACGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CGCGAGGAAGGGCAGGCCTGTCCGCGTCAAGGACAGCGACGAGATCCGCTCAAAGATTGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                GACCGACTCGACGCTCGAACTCGACGGCTACTCGCTCAACCTCGGAGACGTCGTCTCGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GCĂCCTGCCCACAACCCAGGTCACGCĂGGTCGĂCĂTCGTCGĂĞAAGATGCTCGCCGCGCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         ceareeccacecececaccacreecaecreeaearcerecaeaarcerecaecaecec
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CGTCGCATCCGCAAAGCAGGCTGTCAATGGCGCCTCGACCAACCTCGCAGTCGCAGGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CGCCGCTCCGACCAAGTCGGCTGCGGGCCCCACTTCGGCTCTCCGCCGCCACGCCCGGCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CAAGATGCTCGCTTA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             /organism="synthetic construct"
/mal_type="unassigned DNA"
/mal_type="unassigned DNA"
/db xref="matant from Rhodotcrula glutinis"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Location/Qualifiers
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            construct
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 from
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              sequences.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      GI:13184657
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            49.5%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             2151 bp
Patent W00111071.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      2150
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               7.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Score 1196.6; DB 6
Pred. No. 2.5e-136;
1; Mismatches 525;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              DNA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  525;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         DB 6;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           linear
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         (SD)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    and
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            2151;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               24;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 PAT 28-FEB-2001
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Gatenby, A.A.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Gaps
                                                                                                                                                                                                                                                                                                          578
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             104
                                                             698
                                                                                                                                                                                  638
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     284
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   338
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           278
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     164
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        158
   644
                                                                                                                       584
                                                                                                                                                                                                                                            524
                                                                                                                                                                                                                                                                                                                                                                 464
                                                                                                                                                                                                                                                                                                                                                                                                                           518
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         404
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      458
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             344
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              398
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 224
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   218
```

```
1485
                                                                                                                                                                                                                                                                                            1425
                                                                                                                                                                                                                                                                                                                               1476
                                                                                                                                                                                                                                                                                                                                                                    1365
                                                                                                                                                                                                                                                                                                                                                                                                       1416
                                                                                                                                                                                                                                                                                                                                                                                                                                            1305
                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1356
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1245
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1185
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1125
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1179
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1065
                                                                       1605
                                                                                                          1656
                                                                                                                                               1545
                                                                                                                                                                                    1596
                                                                                                                                                                                                                                                          1536
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1296
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1236
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1119
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1005
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1059
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            945
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    885
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               999
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       939
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          825
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              879
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 765
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    819
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         705
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            759
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               645
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GCTCACGGCCATGACGGTCGAAGCGATGGTCGGCCACGCCGGCTCGTTCCACCCCTTCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CGAGGCAGTCGTCCTCGGCCCGAAGGAGGGTCTCGGTCTGGTCAACGGAACGGCCGTCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CTCTCTTCTCCTACATTGCAGCGGCCATCAGCGGTCACCCGGACAGCAAGGTGCACGT
                                                                                                                                                                                                                                                                                                                                                                                               CCTCGCTGCCGAGGACCCCGTCGCTCAACTATCACGGCAAGGGCTTGGACATTCACATCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    TGCCGCTGTGGCCAACACCATGGAGAGACTCGCCTCGGGCTCGCCCAGATCGGCAAGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    GTCGGCTGTCTCGATTCGATGGAGAGAGACCAGGCTCGCACTCGCCCTCATCGGCAAGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CACGACGTCTGCCGCCCGCACCCCGGCAGGTCGAGGTCGCGCGCAACATCCCCACGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   AGCATCGATGGCCACCCTCGCTCTGCACGACGCACACATGCTCTCGCTCCTCGCAGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CGCCTCGATGGCGACCCTCAGTCTGCACGACTCGCACATGCTCTCGCTCTCTCGCAGGC
                                                                                                                                               GTCCAACGACGTCCTTTCTCTCCTCCTCGCCACCCACCTCTACTGCGTTCTCCAAGCCAT
                                                                                                                                                                  GGCCAACGACGTCCTTTCTCTCTCTCTCCCCTCGCACCTGTACTGCACGCTCCAGGCCGT
                                                                                                                                                                                                                                                GGCGTACACCTCGGAGTTGGGACACCTCGCCAACCCTGTGACGACGCATGTCCAGCCGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                            CAACTTCACGCAGCTCACCGAGATGCTCAACGCCGGCATGAACCGCGGCCTCCCCTCCTG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                             CGACAACCCGCTCCTCGACGTCGAGAACAAGCAGACCGCGCGACGGCGAACTTCCAGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          GGGCATTCTTCGCCAGGACCGCTACCCGCTCCGCACGTCGCCTCAGTTCCTCGGCCCGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CCTCGAGGGAAGCCGCTTTGCTGTCCACCATGAGGAGGAGGTCAAGGTCAAGGACGACGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CCTTTCCGGCTCGTTGCCCGTTGAGCACGAGGAGGAGGAGGTCAAGGTCAAGGACGACGA 1118
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            TCACGACGTCACGCGCCTCACCCGACGCAGATCGAAGTCGCGGGAAACATCCGCAAGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            TITGCACGAGGGAACCGAGAAGATCATGTTTGCGCGCGAGGCCATCTCGCTCTTTGGTCT
                                                                                                          CGACCTCCGCGCGATGGAGCTCGACTTCAAGAAGCAGTTCGACCCGCTTCTCCCGACTCT
                                                                                                                                                                                                                       TGAGATGGCGAACCAGGCGGTCAACTCGCTTGCGCTCATCTCGGCTCGTCGCACGACCGA
                                                                                                                                                                                                                                                                                                                             recriacectroseasecrosectroscaacecestraceracerectroscaececes
                                                                                                                                                                                                                                                                                                                                                                    CCTCGCGGCCGAAGACCCCCTCGCTCTCCTACCACTGCAAGGGCCTCGACATCGCCGCTGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CGACAACCCTCTCATCGACGTCGAGAACAAGACTTCGCACCACGGCGGCAATTTCCAGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   GGGCATTCTCCGCCAGGACCGCTACCCCTTGCGCACGTCTCCTCAGTGGCTCGGCCCGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   CGAGCCCGTCGTCCTCGGCCCGAAGGAGGGTCTCGGTCTCGTCAACGGCACCGCCGTCTC
CCTCCAGCACCTCGGCACTGGCCTCGACGTCA----
                                                                       CGACTTGCGCGACCGAGTTCGAGTTCAAGAAGCAGTTCGGCCCAGCCATCGTCTCGCT
                                    ----ACGCACTTGCGCT
                                    1763
                                                                                                          1715
                                                                                                                                                                                    1655
                                                                                                                                                                                                                                                          1595
                                                                                                                                                                                                                                                                                              1484
                                                                                                                                                                                                                                                                                                                                 1535
                                                                                                                                                                                                                                                                                                                                                                                                         1475
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1415
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1355
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1244
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1295
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1184
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1235
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1124
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1178
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1064
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1004
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1058
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              818
                                                                       1664
                                                                                                                                               1604
                                                                                                                                                                                                                     1544
                                                                                                                                                                                                                                                                                                                                                                      1424
                                                                                                                                                                                                                                                                                                                                                                                                                                            1364
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1304
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           884
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      878
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         764
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 704
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      944
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         998
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            938
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   824
```

뫄

8 8 8 8 8

밁

á

밁

Š

밁

8 8

2 2 2 2

Ś

B 8 8 8

1764

1823

/note="mutant

from

Rhodotorula glutinis"

```
RESULT 10
AX370659
LOCUS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               SOURCE
ORGANISM
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ACCESSION
VERSION
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 FEATURES
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             REFERENCE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       KEYWORDS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      DEFINITION
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   JOURNAL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                TITLE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           AUTHORS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CDS
misc_feature
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1896
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1845
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1884
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1785
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1956
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1944
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                2184
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         2076
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 2124
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           2064
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      2004
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1725 GAAGGTGAACAAGACGCTCGCCAAGCGCCTCGAGCAGACCAACTCGTACGACCTCGTCCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   AX370659
Sequence 9 1
AX370659
AX370659.1
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Gatenby,A.A., Sariaslani,F.S., Tang,X.S., (
Bioproduction of para-hydroxycinnamic acid
Patent: WO 0210407-A 9 07-FEB-2002;
E.I. DUFONT DE NEMOURS AND COMPANY (US)
Location/Qualifiers
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              artificial sequences
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     synthetic construct synthetic construct
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GCCCTCTGCCAACGTCACCCTTACTGCCGTCAACGCGTGGAAGGTTGCCTCGGCCGAGAA 1943
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 GECCATCTCGCTCACGCGCGAGGTGCGCAACCGCTTCTGGCAGACGCCGTCTTCGCAGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          GCGCTGGCACGACGCCTTCTCGTACGCGACCGGCACCGTCGTCGTCGAGCTCCTCCTCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CAAGATGCTCGCGTA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CTCGAACGTCTCCAAGATCTACGAGGCCATCAAGTCGGGCAGGATCAACAACGTCCTCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                GAGCAACGTCTCGCGCATCTACGAGGCCATCAAGGACGGCCGCATCAACCTCCTCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GCTCGGCCTGCAGGCGCGCCGACGTCTTTTTTCGGCGAGCAGGAGAGACGATCGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                gecegeceanaceanacererececeses aceses en construction de la constant de la constan
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GGCCATCTCGCTCACCCGCCAAGTCCGCGAGACCTTCTGGTCCGCCGCGTCGACCTCGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              ĠŢĊ-----GCŤĊŢĊĠĊŤĊĠĊĊĠĊĊĠŤĊĂĂĊĠĊĊŤĠĠĂĂĠĠŤĊĠĊĊĠĊĊĠĊĊĠAĠŢĊ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GCGCTGGCACGACGCCTTCTCCTTCGCCGCCGCCACCGTCGTCGAGGTCCTCTCGTCGAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   CAAGATGCTCGCTTA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ecceded retreservados de la constante de la co
                                                                                                                                                                                                                                                                                                                                                                                                               /protein_id="CAD26694.1"
/db_xref="Q1:19168825"
/db_xref="Q1:19168825"
/db_xref="R1:19168825"
/db_xref="R1:19168825"
/db_xref="R2:19168825"
/translation="MAPSLDSISHSFANGVASAKQAVNGASTNLAVAGSHLPTTQVTQ
/translation="MAPSLDSISHSFANGVASAKGRPVRVKDSDEIRSKIDKSVEFLR
SQLSMSYYGVTTGFGGSADTRREDAISLQKALLNEHQLGVLPSSFDSFRLGGLENSL
PLEVVRGAMTIRVNSLTRGHGSAPTRVDAISLQKALLNEHQLTPIVPLRGTISASGDLSPL
SYIAAAISGHEDSKVHVVHEGKEKILYAREAMALFNLEFVVLGFKEGLGIVNGTAVSA
SMATLALHDAHMLSLLSQSLTAMTVEAMVGHAGSFHFFLHDVTRPHPFYGIEVAGNIRK
                                                                                                                                                                                                                                                           LLEGSRFAVHHEEEVKVKDDEGILRQDRYPLRTSPQWLGPLVSDLIHAHAVLTIEAGQ
STTDNPLIDVENKTSHHGGNFQAAAVANTMEKTRLGLAQIGKLNFTQLTEMLNAGMNR
GLPSCLAAEDPSLSYHCKGLDIAAAAYTSELGHLANPYTTHVQPAEMANQAVNSLALI
                                                                                                        SARRTTESNDVLSLLLATHLYCVLQAIDLRATEFEFKKQFGPAIVSLIDQHFGSAMTG
SNLRDELVEKVNKTLAKRLEQTNSYDLVPRWHDAFSFAAGTVVEVLSSTSLSLAAVNA
WKVAAAESAISLTRQVRETFWSAASTSSPALSYLSPRTQILYAFVREELGVKARRGDV
                                                 FLGKQEVTIGSNVSKIYEAIKSGRINNVLLKMLA"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 /transl
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 /mol_type="unassigned
/db_xref="taxon:32630"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  codon_start=1
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   note="unnamed protein"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   organism="synthetic construct"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      2151 bp
from Patent W00210407.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GI:19168824
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           _table=11
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   2150
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                2198
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             DNA"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              product"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  DNA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Qi, W.W.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       linear
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      and Vannelli, T
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             PAT 01-MAR-2002
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1844
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      2183
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   2135
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              2075
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      2123
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              2015
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           2063
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1955
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 2003
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1895
```

ORIGIN  Query Match  Best Local  Matches 156  Qy 159  Db 45  Qy 219  Db 105  Qy 219  Db 165  Qy 279  Db 225  Qy 279  Db 225  Qy 339  Db 225  Qy 339  Db 345  Qy 459  Db 585  Qy 639  Db 645  Qy 8759  Db 645  Qy 879  Db 885  Qy 893  Db 939  Db 935
Similarity Similarity Conservat Cons
St; Score 1196.6; DB 6; Length 2151; ot; Pred. No. 2.5e-336; 1 : Mismatches 525; Indels 24; Ga GetCoactecactecactecactecaccaccaccaccaccaccaccaccaccaccaccaccac
Gaps  Gaps  Gaps  Gaps  Gaps  Gaps  Gapcaccc  Gacccc  Gaccc  Gac
1 1 0 0 4 9 8 3 8 4 8 4 8 4 8 4 8 4 8 4 8 4 8 4 8 4
\$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$
1119 1065 1126 1136 1136 1136 11416 1366 1446 1496 1496 2004 2016
1119 1065 1126 1136 1136 1136 11416 1366 1446 1496 1496 2004 2016
1119 1065 1126 1136 1136 1136 11416 1366 1446 1496 1496 2004 2016

```
REFERENCE
AUTHORS
JOURNAL
COMMENT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     JERSION
CEYWORDS
SOURCE
ORGANISM
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  RESULT 11
RIPALGNA
LOCUS
DEFINITION
ACCESSION
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         片
                             Ş
                                                                        멍
                                                                                                              Ş
                                                                                                                                                     B,
                                                                                                                                                                                    Š
                                                                                                                                                                                                                                  В
                                                                                                                                                                                                                                                                     Š
                                                                                                                                                                                                                                                                                                                                                                                              ORIGIN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      ¥
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                PEATURES
                                                                                                                                                                                                                                                                                                               Matches 1565;
                                                                                                                                                                                                                                                                                                                                      Best Local
                                                                                                                                                                                                                                                                                                                                                      Query Match
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           gene
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CDS
                                                                                                                                                                                                                                                                                                                                                                                                                                 polyA_site
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         2136
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            2184
                                       279
                                                                            165
                                                                                                                  219
                                                                                                                                                         105
                                                                                                                                                                                             159
                                                                                                                                                                                                                                    45
                                                                                                                                                                                                                                                                         99
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             RTPALCNA 2315 bp mRNA linear
R.toruloides mRNA for L-phenylalanine ammonia-lyase
X12702
X12702.1 GT:288350
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Eukaryota; Fungi; Basidiomycota; Urediniomycetes; Microbotryomycetidae; Sporidiobolales; Rhodosporidium 1 (bases 1 to 2315)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     L-phenylalanine ammonia-lyase; Rhodosporidium toruloides Rhodosporidium toruloides
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Unknown
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Unpublished
                                                                                                                                                                                                                                                                                                                                      Similarity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Patented)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CAAGATGCTCGCTTA 2150
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CAAGATGCTCGCGTA
                                                                                                                                                                                      CGATGGCCACGCCACCAGTCGAGACCTCGAGAGTCGTGCAGGAGCTCCTCAGCGACCC
                               CGCCCGCAAGGGCGCCAGGGTCCGCGTCCAGAACGACGACGACGAGATCCGCGCACGCGTCGA
                                                                            GACCGACTCGACGCTCGAACTCGACGGCTACTCGCTCAACCTCGGAGACGTCGTCTCGGC
                                                                                                                                                         GCACCTGCCCACAACCCAGGTCACGCAGGTCGACATCGTCGAGAAGATGCTCGCCGCGCGC
                                                                                                                                                                                                                                                                         CGCCGCTCCGACCAAGTCGGCTGCGGGGCCCCACTTCGGCTCTCCGCCGCACGCCCGGCCT
CGCGAGGAAGGGCAGGCCTGTCCGCGTCAAGGACAGCGACGAGATCCGGCTCAAAGATTGA
                                                                                                                CGTCGCATCCGCAAAGCAGGCTGTCAATGGCGCCTCGACCAACCTCGCAGTCGCAGGCTC
                                                                                                                                                                                                                                                                                                                 Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                      /gene="PAL"
/codon_start=1
/product="L-phenylalanine a
/protein_id="CAA31109.1"
/db_xref="G1.288351"
/db_xref="G1.288351"
                                                                                                                                                                                                                                                                                                                                                                                                                                 FLGKQEVTIGSNVSKIYEAIKSGRINNVLLKMLA"
2315
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                ) EP_0_260_919_A1.
Location/Qualifiers
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       'gene="PAL"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 strain="IFO 559"
/db_xref="taxon:5286"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    organism="Rhodosporidium"

mol_type="mRNA"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          clone="pSW13"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                . 2315
                                                                                                                                                                                                                                                                                                                                 49.5%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 2198
                                                                                                                                                                                                                                                                                                                 <u>,</u>
                                                                                                                                                                                                                                                                                                                 Score 1196.6; DB 8;
Pred. No. 2.4e-136;
1; Mismatches 525;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               PAL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              ammonia-lyase"
                                                                                                                                                                                                                                                                                                                   Indels
                                                                                                                                                                                                                                                                                                                                                      Length
                                                                                                                                                                                                                                                                                                                                                          2315;
                                                                                                                                                                                                                                                                                                                   24;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             (PAL)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            PLN 23-MAR-1993
                                                                                                                                                                                                                                                                                                                   Gaps
                                           338
                                                                                                                                                                                                                                        104
                                                                                                                                                                                                                                                                                158
                                                                                                                      278
                                                                                                                                                             164
                                                                                                                                                                                                 218
    284
                                                                                 224
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            망장
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                          Š
                                                                                                   밁
                                                                                                                                  5
                                                                                                                                                                                B
                                                                                                                                                                                                           δÃ
                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                              80
                                                                                                                                                                                                                                                                                                                                        g
                                                                                                                                                                                                                                                                                                                                                                           Š
                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            멼
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      밁
                                                                                                                                                                                                                                                                                                                                                                                                                       1005
                                                                                                                                                                                                                                                                                                                                                                                                                                                            1059
                                                                                                     1245
                                                                                                                                                                                  1185
                                                                                                                                                                                                                     1236
                                                                                                                                                                                                                                                             1125
                                                                                                                                                                                                                                                                                                                                          1065
                                                                                                                                                                                                                                                                                                                                                                               1119
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                345
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      465
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   405
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        459
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   399
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           285
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               585
5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  639
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         525
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               579
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            519
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                339
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   945
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                885
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             825
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             819
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  645
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       699
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           999
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      939
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   879
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          765
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     705
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            759
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          GAACCACCGCATCACGCCCATCGTCCCCCCCCCCCCGCGCTCCATCTCGGCGTCGGGCGACCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               GCTCACGCGTGGCCACTCGGCCGTCGGCCTCGTCGTCGTTGAGGCGCTCACCAACTTCTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    TCTCGAGAACTCGCTTCCCCTCGAGGTTGTTCGCGGCGCCATGACAATCCGCGTCAACAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   CCTCGAGAACACGCTTCCGCTCGAGGTCGTCCGCGGCGCCATGGTCATCCGCGTCAACTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CGAGCACCAGCTCTGCGGCGTGACGCCGACGTCCGTCCTCCTCCAGCGTCGGACGGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              ATTTGGCGGATCCGCAGACACCCGCACCGAGGACGCCATCTCGCTCCAGAAGGCTCTCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         TTTCGGTGGCTCGGCCGACACGAGGACTGAGGATGCAGTCAGCCTCCAGAAGGCGCTCAT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      CAAGAGCGTCGACTTCCTCAAGGCCCAGCTTCAGAACTCGGTCTACGGAGTCACCACGGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        TTTGCACGAGGAACCGAGAGATCATGTTTGCGCGCGAGGCCATCTCGCTCTTTGGTCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             CAGCCGCTCTCGTACATCGCCGGCGCCATCACCGGTCACCCCGACGTCAAGGTTCACGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               CAACCACGGCATCACCCCCATCGTCCCCCCCCGCGCACCATCTCTGCGTCGGGCGACCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         cdAdCACCAGCTCTGCGGTGTTCTCCCTTCGTCGTTCGACTCGTTCCGCCTCGGCCGCGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             CAAATCGGTCGAGTTCTTGCGCTCGCAACTCTCCATGAGCGTCTACGGCGTCACGACTGG
                                                                                                                                                                                                                                                                                        GGGCATTCTTCGCCAGGACCGCTACCCCCTCCGCACGTCGCCTCAGTTCCTCGGCCCCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                              CCTTTCCGGCTCGTCGTTGCCGTTGAGCACGAGGAGGAGGTCAAGGTCAAGGACGACGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 TCACGACGTCACGCGCCCTCACCCGACGCAGATCGAAGTCGCGGGAAACATCCGCAAGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CCACGACGTCTGCCGCCCCCCCCCGCCCAGCCCAACGTCCGCGCAACATCCGCACGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                GCTCACGGCCATGACGGTCGAAGCGATGGTCGGCCACGCCCGGCTCGTTCCACCCCCTTCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               CTTGACGGCTCTCACGGTGGAGGCCATGGTCGGCCAGCAGGACTCGTTCGCGCCGTTCAT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           agearcearegecacecrerececies acea cacacarecrere en concerce en cacacarecrere en concerce en
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CGCCTCGATGGCGACCCTCAGTCTGCACGACTCGCACATGCTCTCGCTCCTCTCGCAGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               CGTCCACGAGGGCAAGGAGAAGATCCTGTACGCCCGCGAGGCGATGGCGCTCTTCAACCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    crcrccrcrccracarrecaeceeccarcaeceercacceeacaecaecaecaecer
                                                                                                                                       GTCGGCTGTCTCGATTTCGATGGAGAAGACCAGGCTCGCACTCGCCCTCATCGGCAAGCT
                                                                                                                                                                                                               CGACAACCCGCTCCTCGACGTCGAGAACAAGCAGACGCGCACGGCGCAACTTCCAGGC
                                                                                                                                                                                                                                                                                                                                          GGGCATTCTCCGCCAGGACCGCTACCCCTTGCGCACGTCTCCTCAGTGGCTCGGCCCGCT
                                                                                                                                                                                                                                                                                                                                                                                                                         CCTCGAGGGAAGCCGCTTTGCTGTCCACCATGAGGAGGAGGTCAAGGTCAAGGACGACGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      CGAGCCCGTCGTCGTCGGCCCGAAGGAAGGTCTCGGTCTCGTCAACGGCACCGCCGTCTC
                           CAACTTCACGCAGCTCACCGAGATGCTCAACGCCGGCATGAACCGCGGCCTCCCTG
                                                            TGCCGCTGTGGCCAACACCATGGAGAAGACTCGCCTCGGGCTCGCCCAGATCGGCAAGCT
                                                                                                                                                                                  CGACAACCCTCTCATCGACGTCGAGAACAAGACTTCGCACCACGGCGGCAATTTCCCAGGC
                                                                                                                                                                                                                                                               ĊĠŦĊĄĠĊĠĂĊĊŦĊĄŦŦĊĂĊĠĊĊĊĂĊĠĊĊĠŦĊĊŦĊĄĊĊĂŦĊĠĂĠĠĊĊĠĠĊĊĄĠŦĊĠĂĊĠĂĊ
                                                                                                                                                                                                                                                                                                      CGACGAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                818
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           758
                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1118
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1058
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      878
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     644
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          869
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                584
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     638
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            524
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  578
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         464
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               518
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    404
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         458
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      398
                                 1364
                                                                                                                                                                                                                            1295
                                                                                                                                                                                                                                                                                                         1235
                                                                                                                                                                                                                                                                                                                                                1124
                                                                                                                                                                                                                                                                                                                                                                                     1178
                                                                                                                                                                                                                                                                                                                                                                                                                             1064
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1004
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            998
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              824
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         764
                                                                      1415
                                                                                                                                                 1355
                                                                                                                                                                                        1244
                                                                                                                                                                                                                                                                   1184
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    944
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   884
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         938
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        704
                                                                                                              1304
```

В

Ę

bG

158

104

218

278 164

```
TION DNA sequence co...

SION E01783

(CN E01783.1 GI:2170036

(CN E01783.1 GI:2170036

(CN JP 1988317086-A/1.

RCE Rhodosporidium toruloides

ORGANISM Rhodosporidium toruloides

Eukaryota; Fungi; Basiddomycota; Urediniomycetes;

Microbottyomycetidae; Sporidiobolales; Rhodosporidium.

REFERENCE 1 (bases 1 to 2331)

AUTHORS FURUHARA,N, YOSHIHO,S., Watanabe,M., Nakajima,Y. and Makiguchi,N. RECOMBINANT PLASMID FOR MANIFESTING L-PHENVLALANINE-AMMONIA-LYASE

""" TRANSFORMANT CONTAINING SAID PLASMID

""" TRANSFORMANT CONTAINING SAID PLASMID
                                                                                                                 REFERENCE
AUTHORS
TITLE
                                                                                                                                                                                                                                                             LOCUS
DEFINITION
ACCESSION
VERSION
KEYWORDS
                                                                                                                                                                                                                       SOURCE
ORGANISM
                                                                                                                                                                                                                                                                                                                                                                   RESULT
E01783
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 D,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              g,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            뮹
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ş
                                                                           JOURNAL
                                                                                                                                                                                                                                                                                                                                                                                           12
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               2184
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1956
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1896
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1845
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            2016
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    2064
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1944
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1884
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      2004
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1824
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1725
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1764
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1665
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1545
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1485
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1605
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1656
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1596
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1536
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1425
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1476
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1365
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1416
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      GCTCGGCGTGCAGGCGCGCGCGCGGCGACGTGTTTGTCGGCGTGCAGCAGGAGACGATCGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CAAGATGCTCGCGTA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      GAGCAACGTCTCGCGCATCTACGAGGCCATCAAGGACGGCCGCATCAACGACGTCCTCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           GGCCATCTCGCTCACGCGGAGGTGCGCAACCGCTTCTGGCAGACGCCGTCTTCGCAGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      CAAGATGCTCGCTTA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CTCGAACGI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       GCCCGCGCTCTCGTCGCCGCGCACTCAGATCCTCTACGCCTTCGTCCGCGAGGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       GGCCATCTCGCTCACCCGCCAAGTCCGCGAGACCTTCTGGTCCGCCGCGCGTCGACCTCGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               gcccrcrgccaacgrcacccrracrgccgrcaacgcrggaacgrraccrrggccrcgagaa
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GAAGGTGAACAAGACGCTCGCCAAGCGCCTCGAGCAGACCAACTCGTACGACCTCGTCCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GCGCTGGCACGACGCCTTCTCCTTCGCCGCCGCCACCGTCGTCGAGGTCCTCTCGTCGAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CGAGGTCAAGAAGGCGTCAACAAGCGTCTCGAGCAGACGACGACGTACGACCTCGAGCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CATCGACCAGCACTTTGGCTCCGCCATGACCGGCTCGAACCTGCGCGACGAGCTCGTCGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CGACCTCCGCGCGATGGAGCTCGACTTCAAGAAGCAGTTCGACCCGCTTCTCCCGACTCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 GGCCAACGACGICCTITCTCCCCTTCTCGCCTCGCACCTGTACTGCACGCTCCAGGCCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      CCTCCAGCAGCACCTCGGCACTGGCCTCGACGTCA-----ACGCACTTGCGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CGACTTGCGCGCGATCGAGTTCGAGTTCAAGAAGCAGTTCGGCCCAGCCATCGTCTCGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GTCCAACGACGTCCTTTCTCTCCTCCTCGCCACCCACCTCTACTGCGTTCTCCAAGCCAT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     TGAGATGGCGAACCAGGCGGTCAACTCGCTTGCGGTCATCTCGGCTCGTCGCACGACCGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      GÉCGTÁCACCTCGGÁGTTGGGACACCTCGCCAACCCTGTGÁCGACGCATGTCCAGCCGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       COTOGOGGO GÁAGA COCOTOGOTO COTACOA OTOGA A AGO GO COTOGA CATOGO COCOGO COTOGO A CATOGO CO COTOGO COTOGO CO COTOGO COTOGO CO COTOGO COTOGO CO COTOGO COTOGO CO COTOGO COTOG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               CCTCGCTGCCGAGGACCCGTCGCTCAACTATCACGGCCAAGGGCTTGGACATTCACATCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               TECTTACECTTCGGAGCTCGGCCACCTTGCCAACCCGGTCACTACCTTCGTCCAGCCCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CTCCAAGATCTACGAGGCCATCAAGTCGGGCAGGATCAACAACGTCCTCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          -GCTCTCGCTCGCCGCCGTCAACGCCTGGAAGGTCGCCGCCGCCGAGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                       2150
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             2198
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     2135
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               2183
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       2075
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             2123
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       2015
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               2063
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1955
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  2003
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1943
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1844
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1883
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1784
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1823
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1763
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1895
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1715
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1664
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1604
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1655
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1544
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1484
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1535
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1424
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1475
                                                                                        Ş
                                                                                                                                밁
                                                                                                                                                           δõ
                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                  δÔ
                                                                                                                                                                                                                                                                                                                               5
                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                      Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     망
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         맑
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  ORIGIN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      FEATURES
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           COMMENT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Query Match
Best Local S
Matches 1565
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 source
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Local Sim:
                                                                                        699
                                                                                                                                                                                                                   525
                                                                                                                                                                                                                                                        579
                                                                                                                                                                                                                                                                                                   465
                                                                                                                                                                                                                                                                                                                                           519
                                                                                                                                                                                                                                                                                                                                                                                     405
                                                                                                                                                                                                                                                                                                                                                                                                                           459
                                                                                                                                                                                                                                                                                                                                                                                                                                                                     345
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               399
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       285
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               339
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         225
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 279
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         165
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 219
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         105
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   159
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    MITSUI TOATSU CHEM INC
OS Rhodosporidium toruloides
PN JP 1988317086-A/1
PD 26-DEC-1988
PH 18-JUN-1987 JP 1987152357
PF 18-JUN-1987 JP 1987152357
PI FUKUHARA NOBUHIRO, YOSHINO
NAKAJIMA YOSHIYUKI,
PI MAKIGUCHI NOBUYOSHI
PC C12N15/00,C12N1/20//C12N9/8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              .
υ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   99
                                                                CAGCCCGCTCTCGTACATCGCCGGCGCCATCACCGGTCACCCCGACGTCAAGGTTCACGT
                                                                                                                                                             GAACCACCGCATCACCCCATCGTCCCCCCCCCCCGCGCCTCCATCTCGGCGTCGGGCGACCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Similarity
                                                                                                                                CAACCACGGCATCACCCCCATCGTCCCCCTCCGCGCACCATCTCTGCGTCGGGCGACCT
                                                                                                                                                                                                                CTTGACCCGCGCCACTCGGCTGTCCGCCTCGTCCTCGAGGCGCTCACCAACTTCCT
                                                                                                                                                                                                                                                        GCTCACGCGTGGCCACTCGGCCGTCGCCTCGTCGTCCTTGAGGCGCTCACCAACTTCTT
                                                                                                                                                                                                                                                                                                                                        CGAGCACCAGCTCTGCGGCGTGACGCCGACGTCCGYCTCGTCCTTCAGCGTCGGACGCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ATTTGGCGGATCCGCAGACACCCGCACCGAGGACGCCATCTCGCTCCAGAAGGCTCTCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       GACCGACTCGACGCTCGACGGCTACTCGCTCAACCTCGGAGACGTCGTCTCGGC
                                                                                                                                                                                                                                                                                              TCTCGAGAACTCGCTTCCCCTCGAGGTTGTTCGCGGCGCCATGACAATCCGCGTCAACAG
                                                                                                                                                                                                                                                                                                                                                                                CGAGCACCAGCTCTGCGGTGTTCTCCCTTCGTCGACTCGTTCCGCCTCGGCCGCGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        TTTCGGTGGCTCGGCCGACACGAGGACTGAGGATGCAGTCAGCCTCCAGAAGGCGCTCAT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CAAATCGGTCGAGTTCTTGCGCTCGCAACTCTCCATGAGCGTCTACGGCGTCACGACTGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CAAGAGCGTCGACTTCCTCAAGGCCCCAGCTTCAGAACTCGGTCTACGGAGTCACCACGGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               CACCGACGACGTCGTCGAGCTCAGCGGGTACAGCCTCACCGTCGCGTGACGTTGTCGCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CGCGAGGAAGGCCAGGCCTGTCCGCGTCAAGGACAGCGACGAGATCCGCTCAAAGATTGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GCACCTGCCCACAACCCAGGTCACGCAGGTCGACATCGTCGAGAAGATGCTCGCCGCGCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               CGATGGCCACGCCGCACCAGTCGCAGCTCGAGATCGTGCAGGAGCTCCTCAGCGACCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CGTCGCATCCGCAAAGCAGGCTGTCAATGGCGCCTCGACCAACCTCGCAGTCGCAGGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 CGCCGCTCCGACCAAGTCGGCTGCGGGCCCCACTTCGGCTCTCCGCCGCACGCCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    strandedness: Double; topology: Linear; hypothetical: No;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                anti-sense: No;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        MAKIGUCHI NOBUYOSHI
C12N15/00,C12N1/20//C12N9/88,(C12N1/20,C12R1:01),(C12N9/88,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          *source: strain=IFO 559 (ATCC 10788);
Key Location/Qualifiers
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  2152..2331.
Location/Qualifiers
1:.2331
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               /organism="Rhodosporidium
/mol_type="genomic DNA"
/db_xref="taxon:5286"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  49.5%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Score 1196.6;
Pred. No. 2.4e-
1; Mismatches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        /product='L-phenylalanine ammonialyase'
.2331.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    YOSHINO SADAO,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  .4e-136;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            toruloides
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              525;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      DB 6;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      WATANABE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Length 2331;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      MIDORI,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           24;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      ΡI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Gaps
```

밁

638

578

464 518

758 644 869 584 458

344 398 284 338 224

```
1485
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1365
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1416
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1305
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1356
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1245
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1296
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1185
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1236
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1125
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1179
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1065
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1119
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1005
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1059
                                     1764
                                                                               1665
                                                                                                                       1716
                                                                                                                                                               1605
                                                                                                                                                                                                       1656
                                                                                                                                                                                                                                                   1545
                                                                                                                                                                                                                                                                                           1596
                                                                                                                                                                                                                                                                                                                                                                                1536
                                                                                                                                                                                                                                                                                                                                                                                                                        1425
                                                                                                                                                                                                                                                                                                                                                                                                                                                               1476
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           645
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      945
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                999
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        885
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  939
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          825
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  879
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            765
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    819
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      GTCGGCTGTCTCGATTTCGATGGAGAAGACCAGGCTCGCACTCGCCCTCATCGGCAAGCT 1355
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CGACAACCCTCTCATCGACGTCGAGAACAAGACTTCGCACCACGGCGGCAATTTCCAGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GGGCATTCTTCGCCAGGACCGCTACCCGCTCCGCACGTCGCCTCAGTTCCTCGGCCCGCT 1178
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CCTTTCCGGCTCGTCGTTTGCCGTTGAGCACGAGGAGGAGGAGGTCAAGGTCAAGGACGACGA 1118
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CCACGACGTCTGCCGCCCCCCCGCCCAGGCCGAGGTCGCGCGCAACATCCGCACGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        GCTCACGGCCATGACGGTCGAAGCGATGGTCGGCCACGCCGGCTCGTTCCACCCCTTCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             cTTGACGGCTCTCACGGTGGAGGCCATGGTCGGCCAGCAGGGCTCGTTCGCGCCGCTTCAT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        AGCATCGATGGCCACCCTCGCTCTGCACGACGCACACATGCTCTCGCTCCTCGCAGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CGCCTCGATGGCGACCCTCAGTCTGCACGACTGCTCTCGCAGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CGAGCCCGTCGTCCTCGGCCCCGAAGGAAGGTCTCGGTCTCAACGGCACCGCCGTCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CGTCCACGAGGGCAAGGAGAAGATCCTGTACGCCCGCGAGGCGATGGCGCTCTTCAACCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CCTCGCTGCCGAGGACCCCGTCGCTCAACTATCACGGCCAAGGGCTTGGACATTCACATCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    TGCCGCTGTGGCCAACACCATGGAGAAGACTCGCCTCGGGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CGACAACCCGCTCCTCGACGTCGAGAACAAGCAGCCGCGCGCACGGCGACTTCCAGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GGGCATTCTCCGCCAGGACCGCTACCCCTTGCGCACGTCTCCTCAGTGGCTCGGCCCGCT 1124
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CCTCGAGGGAAGCCGCTTTGCTGTCCACCATGAGGAGGAGGTCAAGGTCAAGGACGACGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      TCACGACGTCACGCCCTCACCCGACGCAGATCGAAGTCGCGGGAAACATCCGCAAGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CGAGGCAGTCGTCCTCGGCCCGAAGGAGGGTCTCGGTCTGGTCAACGGAACGGCCGTCTC 878
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    TTTGCACGAGGAACCGAGAAGATCATGTTTGCGCGCGAGGCCATCTCGCTCTTTGGTCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CTCTCCTCTCCTACATTGCAGCGGCCATCAGCGGTCACCCGGACAGCAAGGTGCACGT
GAAGGTGAACAAGACGCTCGCCAAGCGCCTCGAGCCAACCCAACTCGTACGACCTCGTCCC
                               CGAGGTCAAGAAGGCGCTCAACAAGCGTCTCGAGCAAGACGACGACGACGTACGACCTCGAGCC
                                                                                                                                                                                                                                                                              GGCCAACGACGTCCTTTCTCTCTCTCCCCCACCTGTACTGCACGCTCCAGGCCGT
                                                                                                                                                                                                                                                                                                                                                                AGAGATGGGCAACCAGGCCGTCAACTCGCTCGTCATCTCCGCGGCGCCGCACTGCCGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CGACCTCCGCGCGATGGAGCTCGACTTCAAGAAGCAGTTCGACCCGCTTCTCCCGACTCT
                                                                                                                                                                                                                                                                                                                                     TGAGATGGCGAACCAGGCGGTCAACTCGCTTGCGCTCATCTCGGCTCGTCGCACGACCGA
                                                                                                                                                                                                                                                                                                                                                                                                                          GGCGTACACCTCGGAGTTGGGACACCTCGCCAACCCTGTGACGACGCATGTCCAGCCGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                             TecTTACECTTCGGAGCTCGGCCACCTTGCCAACCCGGTCACTACCTTCGTCCAGCCCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CCTCGCGGCCGAAGACCCCCTCGCTCCCTACCACTGCAAGGGCCTCGACATCGCCGCTGC
                                                                               CATICGÁCCAGCÁCTITIGGCTCCGCCATGACCGGCTCGAACCTGCGCGACGAGCTCGTCGA
                                                                                                                       CCTCCAGCAGCACCTCGGCACTGGCCTCGACGTCA------ACGCACTTGCGCT
                                                                                                                                                                 CGACTTGCGCGCGATCGAGTTCGAGTTCAAGAAGCAGTTCGGCCCAGCCATCGTCTCGCT
                                                                                                                                                                                                                                                      CTACTGCGTTCTCCAAGCCAT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1064
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1058
                                          1823
                                                                                  1724
                                                                                                                                                                                                         1715
                                                                                                                                                                                                                                                                                              1655
                                                                                                                                                                                                                                                                                                                                                                                1595
                                                                                                                                                                                                                                                                                                                                                                                                                          1484
                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1535
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1424
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1475
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1364
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1415
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1304
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1244
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1295
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1184
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1235
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1004
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    866
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            884
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  938
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            824
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              764
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      818
                                                                                                                                                                    1664
                                                                                                                                                                                                                                                      1604
                                                                                                                                                                                                                                                                                                                                     1544
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        944
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              704
```

밁

Ŕ

밁

ž

မ္

첫 유

¥

8 8 8 8 8

お 各 お 各 お A

밁

성 유 첫

```
RESULT 13
E01784
LOCUS
DEFINITION
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   KEYWORDS
SOURCE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     ACCESSION
VERSION
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                   ORIGIN
                                                                                                                                                                                                                           FEATURES
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            COMMENT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            REFERENCE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          TITLE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     ORGANISM
Query Match
Best Local Similarity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 JOURNAL
                                                                                                                                                                                                 source
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 2004
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       2136
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          2184
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1956
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1896
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1785
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  2076
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           2124
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                2016
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      2064
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1944
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1845
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1824
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1 (bases 1 to 2331)

1 (bases 1 to 2331)

Pukuhara, N., Yoshino, S., Watanabe, M., Nakajima, Y. and Makiguchi, N. CONTROL OF ADVENTITIOUS GENE MANIFESTATION AND PRODUCTION OF ADVENTITIOUS GENE BRODUCT USING SAID CONTROL

Patent: JP 1988317087-A 1 26-DEC-1988;

MITSUI TOATSU CHEM INC

OS Rhodosporidium
PN JP 1988317087-A/1
PD 26-DEC-1988

PF 18-JUN-1987 JP 1987152358

PI FUKUHARA NOBUHIRO, YOSHINO SADAO, WATANABE MIDORI, PI
NAKAJIWA YOSHIYUKI,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              E01784
DNA se
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          E01784
E01784.1 GI:2170037
JP 1988317087-A/1.
                                                                                                                                                                                                                                                         3'UIR
                                                                                                                                                                                                                                                                                       unidentified
unidentified
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             unclassified.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      GCGCTGGCACGACGCCTTCTCGTACGCGACCGGCACCGTCGTCGAGCTCCTCTCTCGTCCTC 1883
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             GCCCTCTGCCAACGTCACCCTTACTGCCGTCAACGCGTGGAAGGTTGCCTCGGCCGAGAA 1943
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CAAGATGCTCGCTTA 2150
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           GAGCAACGTCTCGCGCATCTACGAGGCCATCAAGGACGGCCGCATCAACCACGTCCTCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   geregecerecaececececeses are references en estados estados estados en entre en estados en estados en estados en estados en estados en entre entre en entre en entre entre en entre en entre en entre entre entre en entre 
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GCCCGCGCTCTCGTACCTCTCGCCGCGCACTCAGATCCTCTACGCCTTCGTCCGCGAGGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GGCCATCTCGCTCACCCGCCAAGTCCGCGAGACCTTCTGGTCCGCCGCGCGTCGACCTCGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               GECCATCTCGCTCACGCGAGGTGCGCAACCGCTTCTGGCAGACGCCGTCTTCGCAGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GCGCTGGCACGACGCCTTCTCCTTCGCCGCCGCCACCGTCGTCGAGGTCCTCTCGTCGAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CAAGATGCTCGCGTA 2198
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               CTCGAACGTCTCCAAGATCTACGAGGCCATCAAGTCGGGCAGGATCAACAACGTCCTCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 sequence coding
                                                                                                                                                                                                                                                                                                               CDS
                                                                                                                                                                                                                                                                                                                                                                                                                          topology: Linear;
hypothetical: No;
anti-sense: No;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             MAKIGUCHI NOBUYOSHI
C12N15/00,C12N9/88,(C12N9/88,C12R1:01);
strandedness: Double;
                                                                                                                                                                                                                                                                                                                                                                    Key
                                                                                                                                                                                                                                                                                                                                                                                                  *source: strain=IFO
                                                                                                                                                                                  /product='L-phenylalanine ammonialyase'
2152. .231.
Location/Qualifiers
1. .2331
                                                                                                           /organism="unidentified'
/mol_type="genomic DNA"
/db_xref="taxon:32644"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       -----GCTCTCGCTCGCCGCCGTCAACGCCTGGAAGGTCGCCGCCGCCGAGTC
     49.5%;
74.0%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 for
                                                                                                                                                                                                                                                                                                                                                                       IFO 559 (ATCC 10788);
Location/Qualifiers
     Score 1196.6; DB 6;
Pred. No. 2.4e-136;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              2331 bp DNA
L-phenylalanine
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 linear I
ammonialyase.
                             Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              PAT 29-SEP-1997
                                                                                                                                                                                                                                                                                          Ę
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           2183
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         2123
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       2063
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1955
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1895
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1844
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   2075
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 2015
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       2003
```

. B & B & B & B & B & B & B & B & B & B	9 Aug. 19 Aug.
459 CGACCACCAGCAGACACCAGACGCACCAGACGCACTCCAGACGCTCCAGACGCTCCACCT 404 459 CGACCACCACCTTCGGCTGTACGCCGACGTCGACGTCCAGACGCGG 518 405 CGACCACCACCTTCGGCTGTACGCTCGACGTCGACGCGG 518 405 CGACCACCACCTTCGGCTGCACGTCGACGTCGACGCGGTCAACTC 519 CCTCGACAACTGGCTTCGGCTTCGACGTTCGACGCCATCGACCTCGACCGCGGCGAACTCGCTTCGACCTCGACCTCGACCTCGACCTCGACCTCGACCTCCCCTCCCCCTCGACGCCCACCACCTCCTCGACCTCCTCGACCTCCTCGACCTCCCCTCCCCCCCC	Matches 1565; Conservative 1; Mismatches 525; Indels 24; Gaps 3; 99 GCCGGCTCCGACGAGTCGGGCTCCGAGTCGGGCCCTCGGCCGCCGCGCCTCGAGGCTCGAGGCTCGAGGCTCGAGGCTCGAGGCTCGAGGCTCGAGGCTCGAGGCTCGAGGCTCGAGGCTCGAGGCTCCGAGGCTCCAAGGCTCCAAGGCTCGAAGCTCGAGGCTCCAAGGCTCCAAGGCTCCAAGGCTCCAAGGCTCCAAGGCTCCAAGGCTCCAAGGCTCCAAGGCTCCAAGGCTCCAAGGCTCCAAGGCTCCAAGGCTCAAGGATCCGCGGAGATCCGCGCAAGGTCAAGGTCAAGGCTCAAGGATTCAAGAATTCAAGAATTCAAGAATTCAAGAATTCAAGAATTCAAGAATTCAAGAATTCAAGAATTCAAGAATTCAAGAAGATTCAAGAAGAATTCAAGAAGAATTCAAGAAGAATTCAAGAAGAATTCAAGAAAGA
	·
B	9 9 9 9 9 9 9 9 9
1425 GGGTRACACCTGGAAGTTGGAACACCTGGCCAACCCTGTACGACGATGTCCAGCCGCC 148 1536 AAGATGGCAACCACGCCGTCAACTCGCTCTCATCTCCCGCGCCGCCCGC	179 CGTGGAGGACATGATGCACGCCTACTCGACTCTCGCTCGAGAACAACACGACGACACACGACGACACACACGACGACACACACGACGACACACACGACGACACACAC

CHERY MATCH  49.5%; SCORE 1196.5; DB 6; Length 2439;  Best Local Similarity 74.0%; Pred. No. 2.4e-136;  Matches 1565; Conservative 1; Mismatches 525; Indels 24; Gaps 3;  99 CGCCGCTCCGACCAAGTCGGGCCCCACTTCGGCTCTCCGCCGCACGGCCT 158	439 nism="unknown" type="unassigned DNA"	Phenylalanine ammonia lysse polypeptide and polynucleotide sequences and methods of obtaining and using same Patent: US 6355468-A 18 12-MAR-2002; Location/Qualifiers	1 Unknown. Unclassified. 1 (bases 1 to 2439) Voshida B K and Kootstra B B	GI:20249679	AR199605 2439 bp DNA linear PAT 20-APR-2002 Sequence 18 from patent US 6355468.			6 GCTTGGCGTCAAGGCCCGCGGGAGACGTCTTCCTCGGCAAGCAA					1784	1724	1605 CGACTTGCGCGCGAGTTCGAGTTCGAGGTCAAGGCAGTCTGGCT 1664  1716 CCTCCAGCAGCACCTCGGCACTCGACGTCAAGGCACTTGCGCT 1763	1715	1545 GTCCAACGACGTCCTTCTCCTCCTCCTCCACCCACCTACTGCACGTCCAGGCCAT 1655
Db 1065 GGCATTCTCCGCCAGGACGCTACCCCTTGCGCACGTCTCCTCAGTGGCTCGGCCGCT 1124  Oy 1179 CGTGGAGGACATGATGCACGCCTACTCGACTCTCTCGCGAGAACAACACGACGAC 1235	Dy       1059       CCTTTCCGGCTCGTTTGCCGTTGAGCACGAGAGAGAGGAGGACGAAGGTCAAGGTCAAGGACGACGA       1118         Db       1005       CCTCGAGGGAAGCCGCTTTGCTGTCCACCATGAGGAGGAGGAGGTCAAGGTCAAGGACGACGA       1064         Db       1119       GGGCATTCTTCGCCAGGACCGCTACCCGCTCCGCACGTTCAGGTCCAAGGTTCCTCGGCCCGCT       1178	Qy 999 CCACGACGTCTGCCGCCCGCACCCCGGCCAAGGTCGAGGTCGCGCGCAACATCCGCACGCT 1058	Qy 939 CTTGACGGCTCTCACGGTGGAGGCCATGGTCGGCCAGGAGGGCTCGTTCGCGGCCGTTCAT 998	Qy 879 CGCCTCGATGGCGACCCTCAGTCTGCACGACTCGCACATGCTCTCGCTCCTCTCGCAGGC 938	Qy 819 CGAGGCAGTCGTCCTCGGCCCGAAGGAGGGTCTCGGTCTGGTCAACGGAACGGCCGTCTC 878	Qy 759 TITGCACGAGGAACGAGAAGATCATGTTTGCGCGCGAGGCCATCTCGCTCTTTGGTCT 818	Qy 699 CAGCCCGCTCTCGTACATCGCCCGCGCCCATCACCCGGTCACCCCGACGTCAAGGTTCACGT 758	Qy 639 GAACCACCGCATCACGCCCATCCGCCGCGCGCGCCCATCTCGGGGGTCGGGCGACCT 698	Qy 579 GCICACGCGTGGCCACICGGCCGTCGCCTCGTCGTCCTTGAGGCGCTCACCAACTTCTT 638	Qy 519 CCTCGAGAACACGCTTCCGCTCGAGGTCGTCCGCGGGCCCATGGTCATCCGCGTCAACTC 578	Qy 459 CGAGCACCAGCTCTGCGGCGTGACGCCGACGTCCGYCTCGTCCTTCAGCGTCGGACGCGG 518	Qy 399 TTTCGGTGGCTCGGCCGACACGAGGACTGAGGATCAGCCTCCAGAAGGCGCTCAT 458	OY 339 CAAGAGCGTCGACTTCCTCAAGGCCCAGCTTCAGAACTCGGTCTACGGAGTCACCACGG 398	, N, N	165 GACCGACTCGACGCTCGACGCTCGACGCTACTCGCTCGAGACGTCGTCTCGGC	Db 105 GCACCTGCCCACAACCCAGGTCACGCAGGTCGACATCGTCGAGAAAGATGCTCGCCGCGCC 164 Qy 219 CACCGACGACGTCGTCGAGCTCAGCGGTACAGCCTCACCGTGACGTCGACGTTGTCGGGGC 278	159 CGATGGCCACGCGCGCACCAGTCGCAGCTCGAGATCGTGCAGGAGCTCCTCAGCGACCC

밁

참 음 차

5 B 5

Search completed: September 11, 2004, 23:12:38 Job time: 14904.6 secs

					ì		
	-1						
				24.5		•	
			,	• • •			
•							
		·			52.0		
,					·		
			40				

```
Result
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   scoring table:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Post-processing: Minimum Match 0% Maximum Match 10
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              vinimum DB seq length: 0
viaximum DB seq length: 200000000
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                lotal number of hits satisfying chosen parameters:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             sequence:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Title:
Perfect score:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                M nucleic
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         97.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Pred. No. is the number of results predicted by chance to have a score greater than or equal to the score of the result being printed, and is derived by analysis of the total score distribution.
                                                                                                                    1704
1629
1198.2
1196.6
1196.6
1196.6
1196.6
1196.6
                                                                                                                                                                                                                                                                                                                                                                                               1826.6
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Score
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  ı
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              nucleic search, using sw model
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             10:
10:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               US-09-939-408A-12
2419
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Query
Match
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                IDENTITY_NUC Gapop 10.0 , Gapext 1.0
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           September 11, 2004, 10:03:28
1000.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.00 1700.0
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        3373863 seqs, 2124099041 residues
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Maximum Match 100%
Listing first 45 summaries
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     N_Geneseq_29Jan04:*
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            GenCore version 5.1.6 Copyright (c) 1993 - 2004 Compugen Ltd
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           geneseqn2003bs:*
geneseqn2003cs:*
geneseqn2004s:*
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          geneseqn2001bs:*
geneseqn2002s:*
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              geneseqn1980s:*
geneseqn1990s:*
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           geneseqn2003as:*
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        geneseqn2001as:*
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        geneseqn2000s:*
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Length
  DB
                                       AAD33076
AAD3100
AAD3100
AAD356543
ADE36055
AAN81105
AAN81116
ABA95243
AAD45815
AAD33152
AAD33075
AAD33075
AAD33075
                                                                                                                                                                                                                                                                                                               ABA95240
AAD45812
ABA95251
AAD45823
AAD45824
ABA95244
ABA95244
AAD45816
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           IJ
  ADE36053
ADE36061
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        SUMMARIES
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 28 ; Search time 1334.06 Seconds
(without alignments)
7703.105 Million cell updates/sec
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       6747726
                                                                                                                                                                                                              Aad33100 R. glutin
Aad26924 Rhodotoru
Abs56543 R. glutin
Ade36055 Rhodospor
                                                                                                                                                                                                                                                                                                                                                                                                     Aba95251
Aad45823
                                                                                                                                                                                                                                                                                                                                                                                                                                               Aba95240 R. gramin
Aad45812 Rhodotoru
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Description
                                                                                                                                                                         Aan8111
                                                                                                                                                                                                                                                                                                Aad33076
                                                                                                                                                                                                                                                                                                                      Aad33097
                                                                                                                                                                                                                                                                                                                                        Aad45816
                                                                                                                                                                                                                                                                                                                                                                Aba95244
                                                                                                                                                                                                                                                                                                                                                                                    Aad45824 Yeast
                                                                                                                                                 Aba95243
                                                                                                                                                                                           Aan81101
                      16 L-phenyla
16 L-phenyla
243 R. torulo
315 Rhodotoru
152 R. glutin
757 Rhodotoru
23 Rhodotoru
23 Rhodospor
                                                                                                                                                                                                                                                                                                                                          Rhodotoru
Phenylala
                                                                                                                                                                                                                                                                                                  Rhodotoru
                                                                                                                                                                                                                                                                                                                                                                                                          R. gramin
Rhodotoru
                                                                                                                                                                                                                                                                                                                      glutin
                                                                                                                                                                                                                                                                                                                                                                                    phe
```

45	44	43	42	41	40	39	38	37	36	<u>ა</u>	34	ω G	32	31	30	29	28	27	26	25	24	
402	620.6	630.4	784	σ.	٥,	ω	φ.			μ.	ω	ω.	ω.		1193.4	93.	93.		9	1195	9	
σ	ហ	9	Ν	~	7	œ	ဖ	ø	9	9	9	9.	9	9	49.3	9	φ.	φ.	9	9	9	
2124	1355	1218	2987	2787	2787	2085	2061	2151	2151	2151	2151	2151	2151	2151	2151	2151	2151	2151	2328	2151	2151	
7	Н	μ	Н	σ	σ	۳	σ	w	9	9	9	9	9	9	σ	თ	σ		μ.	9	9	
W	AAN80457	U		AAD45814	ABA95242	AAN82309	AAD33095	ADE36071	E3606	90	ADE36057	07	3606	3605	D3 3		AAD33099	AAN91092	139	9	0	
σ	145	100	0400	5814	0242	2309	2605	36071	000	000	36057	30075	3000	0.0000	860550	33096	G33099	7607613	7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	85000	0.00/0	1
Kice dene	sequence	Sequence	eduerro	DOGOLO	k. rubra/	ď	Knodocoru	Knodospor	rodespor	KIOGOSPOL	Kuodospor	RIOGOSPOL	) (	) (	nuc		. grut	Thions	eduerroe	deoport	KILOGOSPOE	1

## ALIGNMENTS

```
RESULT 1
ABA95240
ABA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                PAL; yeast; phenylalanine ammonia lyase; cinnamic acid; cinnamate; ss; cytostatic; anti-HIV; virucide; nootropic; dermatological; gene therapy.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             R. graminis PAL polypeptide encoding cDNA.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Rhodotorula graminis.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               10-JUN-2002
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ABA95240;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            ABA95240 standard; cDNA; 2419
                                                                                                                                                                                                                  Phenylalanine ammonia lyase polypeptide and polynucleotide useful for treating mammal having disease or disorder from phenylketonuria, cance human immunodeficiency virus infection and human cytomegalovirus
                                                                                                 Claim 4; Fig 2; 135pp; English.
                                                                                                                                                                                                                                                                                                                                                                      WPI; 2002-268973/31.
P-PSDB; ABB07690.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Yoshida RK, Kootstra AB;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    24-JUL-2000; 2000US-00624693
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              24-JUL-2001; 2001WO-US023270.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            31-JAN-2002.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  WO200208402-A2.
                                                                                                                                                                                       infection.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              (PCBU-) PCBU SERVICES INC.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               (first entry)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Location/Qualifiers
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       /*tag= a
/transl_except= (pos: 493. .495, aa: Xaa)
/note= "Xaa = Val or Ala"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 37. .2199
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    /product= "phenylalanine ammonia lyase"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   BP.
                                                                                                                                                                                                                                                                                cancer,
```

The invention relates to an isolated and purified yeast phenylalanine ammonia lyase (PAL) polypeptide. The PAL encoding polynucleotide or a

```
Ś
                                  В
                                                                                                         B
                                                                                                                                    Ş
                                                                                                                                                                               В
                                                                                                                                                                                                               8
                                                                                                                                                                                                                                                  В
                                                                                                                                                                                                                                                                                   8
                                                                                                                                                                                                                                                                                                                         В
                                                                                                                                                                                                                                                                                                                                                    8
                                                                                                                                                                                                                                                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                                                                                                                                                               Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                    В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               ភពពេលស្តេស្ត្រស្ត្រ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Matches 2419;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Query Match 100.0%;
Best Local Similarity 100.0%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        host cell comprising the polynucleotide is useful for the production of I-PAL, by adding the polynucleotide or the host cell to a composition comprising trans-cinnamic acid, or trans-cinnamate and ammonia; and for improving the production of PAL, its analog or another optically active unnatural amino acid having PAL-like structure. The PAL polynucleotides are useful for treating a mammal having a disease, disorder or condition selected from phenylketonuria, cancer, human immunodeficiency virus infection and human cytomegalovirus infection. The present sequence represents a R. graminis PAL polypeptide encoding cDNA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Sequence 2419 BP; 416 A; 909 C; 659 G; 434 T; 0 U; 1 Other;
                                    781
                                                                                                         721
                                                                                                                                                                               199
                                                                                                                                                                                                                 661
                                                                                                                                                                                                                                                    601
                                                                                                                                                                                                                                                                                        601
                                                                                                                                                                                                                                                                                                                           541
                                                                                                                                                                                                                                                                                                                                                            541
                                                                                                                                                                                                                                                                                                                                                                                                  481
                                                                                                                                                                                                                                                                                                                                                                                                                                     481
                                                                                                                                                                                                                                                                                                                                                                                                                                                                        421
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        421
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    121
                                                                       781
                                                                                                                                          721
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   دم
                                                                                                                                                                                 GTCCCCTCCGCGGCTCCATCTCGGCGTCGGGCGACCTCAGCCCGCTCTCGTACATCGCC
                                                                                                                                                                                                      GTCCCCCTCCGCGCCTCCATCTCGGCGTCGGGCGACCTCAGCCCCGCTCTCGTACATCGCC
                                                                                                                                                                                                                                                                             GICCGCCTCGTCGTCCTTGAGGCGCTCACCAACTTCTTGAACCACCGCATCACGCCCATC 660
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GCGGGCCCCACTTCGGCTCTCCGCCGCCGCACGCCCGGCCTCGATGGCCACGCCGCCCACCAG 180
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   AAGGAGGGTCTCGGTCTGGTCAACGGAACGGCCGTCTCCGCCTCGATGGCGACCCTCAGT
                                    ATCATGTTTGCGCGCGAGGCCATCTCGCTCTTTGGTCTCGAGGCAGTCGTCCTCGGCCCG
                                                                     ATCATGTTTGCGCGCGAGGCCATCTCGCTCTTTGGTCTCGAGGCAGTCGTCCTCGGCCCG
                                                                                                           GGCGCCATCACCGGTCACCCCGACGTCAAGGTTCACGTTTTGCACGAGGGAACCGAGAAG
                                                                                                                                          GGCGCCATCACCGGTCACCCCGACGTCAAGGTTCACGTTTTGCACGAGGGAACCGAGAAG 780
                                                                                                                                                                                                                                                      GTCCGCCTCGTCGTCGTTGAGGCGCTCACCAACTTCTTGAACCACCGCATCACGCCCATC
                                                                                                                                                                                                                                                                                                                             GAGGTCGTCCGCGGCGCCATGGTCATCCGCGTCAACTCGCTCACGCGTGGCCACTCGGCC
                                                                                                                                                                                                                                                                                                                                                              GAGGTCGTCGCGGCGCCATGGTCATCCGCGTCAACTCGCTCACGCGTGGCCACTCGGCC 600
                                                                                                                                                                                                                                                                                                                                                                                                ACGCCGACGTCCGYCTCGTCCTTCAGCGTCGGACGCGGCCTCGAGAACACGCTTCCGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                           ACGCCGACGTCCGYCTCCGTCCTTCAGCGTCCGACACGCGCCTCGAGAACACACGCTTCCGCTC 540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                        AGGACTGAGGATGCAGTCAGCCTCCAGAAGGCGCTCATCGAGCACCAGCTCTGCGGCGTG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    AGGACTGAGGATGCAGTCAGCCTCCAGAAGGCGCTCATCGAGCACCAGCTCTGCGGCGTG 480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               GCCCAGCTTCAGAACTCGGTCTACGGAGTCACCACGGGTTTCGGTGGCTCGGCCGACACG 420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CGCGTCCAGAACGACGAGATCCGCGCACGCGTCGACAAGAGCGTCGACTTCCTCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CGCGTCCAGAACGACGACGAGATCCGCGCACGCGTCGACAAGAGCGTCGACTTCCTCAAG 360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         TCGCAGCTCGAGATCGTGCAGGAGCTCCTCAGCGACCCACCGACGACGTCGTCGAGCTC 240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    GCGGGCCCCACTTCGGCTCTCCGCCGCACGCCCGGCCTCGATGGCCACGCCGCGCACCAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             GCCACCACGCTCGCCAACGGCTTTACCAACGGCTCGCACGCCGCTCCGACCAAGTCGGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          GCCACCACGCTCGCCAACGGCTTTACCAACGGCTCGCACGCCGCTCCGACCAAGTCGGCT 120
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GCCCAGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               TCGCAGCTCGAGATCGTGCAGGAGCTCCTCAGCGACCCCACCGACGACGTCGTCGAGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               TCAGAACTCGGTCTACGGAGTCACCACGGGTTTCGGTGGCTCGGCCGACACG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      0,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Pred. No. 0; 
ismatches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Score 2418.6;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      DB 6; Length 2419;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      0,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      ٥.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Gaps
                                      840
                                                                         840
                                                                                                                                                                                                                                                                                                                                                                                                                                                                        480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         120
                                                                                                                                                                                                                                                                                                                                                                                                  540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         300
                                                                                                                                                                                 720
                                                                                                                                                                                                                                                      660
                                                                                                                                                                                                                                                                                                                             600
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      0
                   S
                                                       뮹
                                                                                                                                                         Ş
                                                                                                                                                                                                                                                                       片
                                                                                                                                                                                                                                                                                                        Ś
                                                                                                                                                                                                                                                                                                                                                                                                                    멍
                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ď,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     망
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                      Ś
                                                                                                                           片
                                                                                                                                                                                                β,
                                                                                                                                                                                                                             5
                                                                                                                                                                                                                                                                                                                                            밁
                                                                                                                                                                                                                                                                                                                                                                           Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  뭉
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      á
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      $
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            망
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   뮹
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                     1921
                                                       1861
                                                                                                                             1801
                                                                                                                                                                                                                                                                                                                                              1621
                                                                                                                                                                                                                                                                                                                                                                                 1621
                                                                                                                                                                                                                                                                                                                                                                                                                      1561
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1501
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1441
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1441
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1321
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1261
                                                                                                                                                                                                                                                                         1681
                                                                                                                                                                                                                                                                                                                                                                                                                                                        1561
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1261
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1201
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1201
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1141
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1141
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1081
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1081
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1021
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1021
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              961
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 961
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     901
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        901
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           841
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       AACTATCACGGCAAGGGCTTGGACATTCACATCGCTGCTTACGCTTCGGAGCTCCGGCCAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         AAGGAGGGTCTCGGTCAACGGAACGGCCGTCTCCGCCTCGATGGCGACCCTCAGT
TGGAAGGTTGCCTCGGCCGAGAAGGCCATCTCGCTCACGCGGAGGTGCGCAACCGCTTC 1980
                                                                              GTCGTCGAGCTCCTCTCGTCCTCGCCCTCTGCCAACGTCACCCTTACTGCCGTCAACGCG 1920
                                                                                                                                                  ACGACGACGTACGACCTCGAGCCGCGCTGGCACGCCTTCTCGTACGCGACCGGCACC
                                                                                                                                                                                                                             CTCGACGTCAACGCACTTGCGCTCGAGGTCAAGAAGGCGCTCAACAAGCGTCTCGAGCAG
                                                                                                                                                                                                                                                                                            TTCAAGAAGCAGTTCGACCCGCTTCTCCCGACTCTCCTCCAGCAGCACCCTCGGCACTGGC 1740
                                                                                                                                                                                                                                                                                                                                                                     CTCGCCTCGCACCTGTACTGCACGCTCCAGGCCGTCGACCTCCGCCGCGATGGAGCTCGAC 1680
                                                                                                                                                                                                                                                                                                                                                                                                                                             AACAAGCAGACCGCGCACGGCGGCAACTTCCAGGCGTCGGCTGTCTCGATTTTCGATGGAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GTTGAGCACGAGGAGGTCAAGGTCAAGGACGACGAGGGCATTCTTCGCCAGGACCGC 1140
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CCCGGCCAGGTCGAGGTCGCGCGCAACATCCGCACGCTCCTTTTCCGGCTCGTCGTTTGCC 1080
                                                       GICGICGAGCICCICTCGCCTCGCCCAACGICACCCTTACTGCCGTCAACGCG 1920
                                                                                                                             ACGACGACGTACGACCTCGAGCCGCGCTGGCACGACGCCTTCTCGTACGCGACCGGCACC
                                                                                                                                                                                                  CTCGACGTCAACGCACTTGCGCTCGAGGTCAAGAAGGCGCTCAACAAGCGTCTCCAGCAG
                                                                                                                                                                                                                                                                         TTCAAGAAGCAGTTCGACCCGCTTCTCCCGACTCTCCAGCAGCACCTCGGCACTGGC 1740
                                                                                                                                                                                                                                                                                                                                              CTCGCCTCGCACCTGTACTGCACGCTCCAGGCCGTCGACCTCCGCGCGATGGAGCTCGAC 1680
                                                                                                                                                                                                                                                                                                                                                                                                                      TCGCTCGCTCATCTCCGCGCGCGCGCACTGCCGAGGCCAACGACGTCCTTTCTCTCTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CTTGCCAACCCGGTCACTACCTTCGTCCAGCCCGCAGAGATGGGCAACCAGGCCGTCAAC 1560
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             CITGCCAACCCGGTCACTACCTTCGTCCAGCCCGCAGAGATGGGCAACCAGGCCGTCAAC 1560
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              AACTATCACGGCAAGGGCTTGGACATTCACATCGCTGCTTACGCTTCGGAGCTCGGCCAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CTCAACGCTGCCATGAACCGCGGCCTGCCTTCGTGCCTGCTGCCGAGGACCCGTCGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CTCAACGCTGCCATGAACCGCGGCCTGCCTTCGTGCCTCGCTGCCGAGGACCCGTCGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             AAGACCAGGCTCGCACTCGCCCTCATCGGCAAGCTCAACTTCACGCAGTGCACCGAGTTG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             AAGACCAGGCTCGCACTCGCCCTCATCGGCAAGCTCAACTTCACGCAGTGCACCGAGTTG 1380
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  AACAAGCAGACCGCGCACGGCGAACTTCCAGGCGTCGGCTGTCTCGATTTCGATGGAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       TACTCGACTCTCTCGCTCGAGAACAACACGACGACCGACAACCCGCTCCTCGACGTCGAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            TACCCGCTCCGCACGTCACTTCCTCGGCCCGCTCGTGGAGGACATGATGCACGCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             TACCCGCTCCGCACGTCGCCTCAGTTCCTCGGCCCGCTCGTGGAGGACATGATGCACGCC 1200
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GTTGAGCACGAGGAGGTCAAGGTCAAGGACGACGACGAGGCCATTCTTCGCCAGGACCGC 1140
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CCCGGCCAGGTCGAGGTCGCGCAACATCCGCACGCTCCTTTCCGGCTCGTCGTTTGCC 1080
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GCCATGGTCGGCCAGCAGGGCTCGTTCGCGCCGTTCATCCACGACGTCTGCCGCCGCAC 1020
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               CTGCACGACTCGCACATGCTCTCGCTCTCTCGCAGGCCTTGACGGCTCTCACGGTGGAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CTGCACGACTCGCACATGCTCTCGCTCCTCTCGCAGGCCTTGACGGCTCTCACGGTGGAG 960
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1500
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1380
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1260
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1200
                                                                                                                                                                                                      1800
                                                                                                                                                                                                                                                                                                                                                                                                                       1620
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1440
```

```
В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    문
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    당
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ą
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             В
                                                                                                                                                                                                                                                                                                                                                                                                                                                              B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              á
                                                                                                                                                                                                                                                                                   Yeast; phenylalanine ammonia lyase; PAL; EC 4.3.1.5; phenylketonuria; cancer; human immunodeficiency virus infection; HIV; gene therapy; hC human cytomegalovirus infection; cytostatic; virucide; gene; ds.
                                                                                                                                                                                                                                                                                                                                 Rhodotorula graminis PAL DNA
                                                                                                                                                                                                                                                                                                                                                         27-DEC-2002
                                                                                                                                                                                                                                                                                                                                                                                                     AAD45812
  WPI; 2002-690616/74
                                                                    24-JUL-2000;
24-JUL-2001;
                                                                                                     24-AUG-2001;
                                                                                                                                                 US2002102712-A1
                                                                                                                                                                                                                                                               Rhodotorula graminis
                       Yoshida RK,
                                                                                                                                                                                                                                                                                                                                                                                                                                                              2401
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  2401
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        2341
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              2341
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     2281
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           2281
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  2221
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        2221
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             2161
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     2161
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          2101
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                2101
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       2041
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            2041
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1981
                                             PCBU
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GACGCCCGCCTCACCCCAAGACCAGCTTTTCGACGTCGTCGTGCCCAAGAACGGACTTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GGCCGCATCAACCACGTCCTCGTCAAGATGCTCGCGTAAGGCCCGAGCAAGCCTCGCCTA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          GGCGTGCAGCAGGAGACGATCGGGAGCAACGTCTCGCGCATCTACGAGGCCATCAAGGAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GGCGTGCAGCAGGAGACGATCGGGGAGCAACGTCTCGCGCATCTACGAGGCCATCAAGGAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ĊŢĠŢĂĊŢĊĠŢŢĊĠŢĠĊĠĊĠĂĠĠĀĠĊŢĊĠĠĊĠŢĠĊĀĠĠĊĠĊĠĊĠĊĠĠĊĠĀĊĠŢĠŢŢŢĠŢĊ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    тессисисстсттсесиесссеесесистичестстсессессиссессе
                                                                                                                                                                                                                                                                                                                                                                                                                                                                           AGTTCAAAAAAAAAAAAA 2419
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CCCGCGTCTCTCGGTCGTCAGTACACGTGTATAGAGCCTGGAATGGATTGCAAGTCTTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CCTCCATACACATGTCGCCTTACTCTCTCGCCGTCATCACGTCTCTCAGTTCTTTCGTAT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GACGCCCCCCAAGACCAGCTTTTCGACGTCGTGTCGTGCCAAGAACGGACTTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GCCGCATCAACCACGTCCTCGTCAAGATGCTCGCGTAAGGCCCGAGCAAGCCTCGCCTA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   TGGCAGACGCCGTCTTCGCAGGCGCGCGCACGCATACCTCTCGCCGCGCACGCGCGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             TGGAAGGTTGCCTCGGCCGAGAAGGCCATCTCGCTCACGCGCGAGGTGCGCAACCGCTTC 1980
                                                                                                                                                                                                                                                                                                                                                                                                     standard;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CCCGCGTCTCCGGTCAGTACACGTGTATAGAGCCTGGAATGGATTGCAAGTCTTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     cerecatacacarereecertaererereecereareacererereaerrereraer
                                                                                                                                                                                                                                                                                                                                                                                                                                                              AGTTCAAAAAAAAAAAAAA
                                                                                                     2001US-00939408
                                                                                                                                                                                                                                                                                                                                                         (first entry)
                                                                    2000US-00624693.
2001WO-US023270.
                         Kootstra
                                              SERVICES INC
                                                                                                                                                                                                                             Location/Qualifiers 37. .2199
                                                                                                                                                                      /product= "PAL protein"
/EC number="4.3.1.5"
/transl except= (pos:493. .495,
/note= "Xaa corresponds to Val
                                                                                                                                                                                                                     /*tag= a
                                                                                                                                                                                                                                                                                                                                                                                                     DNA;
                         AB;
                                                                                                                                                                                                                                                                                                                                                                                                     2419
                                                                                                                                                                                                                                                                                                                                                                                                                                                              2419
                                                                                                                                                                                                                                                                                                                                   #1
                                                                                                                                                                                                                                                                                                                                                                                                       BP.
                                                                                                                                                                                   .495,
                                                                                                                                                                       5, aa:Xaa)
l or Ala"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     . 2220
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    2040
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          2040
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 2400
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             2340
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    2280
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          2280
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                2220
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            2160
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 2160
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       2100
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              2100
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           2400
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         2340
```

P-PSDB; AAE27938.

Novel isolated and purified Rhodotorula phenylalanine ammonia lyase polypeptide, useful for treating a mammal having phenylketonuria, cohuman immunodeficiency virus or human cytomegalovirus infection.

Claim 27-29; 74pp; English.

The present invention relates to yeast (e.g. Rhodotorula) phenylalanine ammonia lyase (PAL, EC 4.3.1.5) proteins and polynuclectides encoding such proteins. PAL sequences are useful for producing L-phenylalanine. They are useful for treating mammals having diseases, disorders or conditions that would benefit from treatment with PAL proteins such as phenylketonuria, cancer, human immunodeficiency virus infection (HIV) or human cytomegalovirus (hCMV) infection. Sequences of the invention are also used in gene therapy. The present sequence is R. graminis PAL DNA

Sequence 2419 BP; 416 A; 909 C; 659 G; 434 T; 0 U; 1 Other;

2419;

```
5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            맑
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       멍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  망
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                S
                                                                                                                                 맑
                                                                                                                                                                                                 8
                                                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                                                                                     Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                             망
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Query Match
Best Local Similarity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Matches 2419;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 481
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                421
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              421
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           541
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         541
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    481
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    121
                                                  721
                                                                                                                                                                                                                        661
                                                                                                                                                                                                                                                                                                                                                                                                        109
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              μ,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GAGGTCGTCCGCGCGCCATGGTCATCCGCGCGTCAACTCGCTCACGCGTGGCCACTCGGCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ACGCCGACGTCCGYCTCCGTCCAGCGTCGGACGGGCCTCGGGAGAACACGCTTCCGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GCCCAGCTTCAGAACICGGTCTACGGAGICACCACGGGITTCGGIGGCTCGGCCGACACG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             CGCGTCCAGAACGACGACGACGATCACCGCGCACGACGACAAGAGCGTCGACTTCCTCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          AGCGGGTACAGCCTCACCGTCGTGACGTTGTCGGCGCCGCCCAAGGGGCGCAAGGGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         TCGCAGCTCGAGATCGTGCAGGAGCTCCTCAGCGACCCACCGACGACGACGTCGTCGAGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 GCGGGCCCACTTCGGCTCTCCGCCGCACGCCCGGCCTCGATGGCCACGCCGCGCACCAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    GCCACCACGCTCGCCAACGGCTTTACCAACGGCTCGCACGCTCCGACCAAGTCGGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   GCCACCACGCTCGCCAACGGCTTTACCAACGGCTCGCACGCCGCTCCGACCAAGTCGGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      crecrecerencia de constante de la constante de
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ACGCCGACGTCCGTCCTTCAGCGTCGGACGCCTCGAGAACACGCTTCCGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      GCCCAGCTTCAGAACTCGGTCTACGGAGTCACCACGGGTTTCGGTGGCTCGGCCGACACG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       AGCGGGTACAGCCTCACCGTCACGTGACGTTGTCGGCGCCGCCACGCCAAGGGGCGCAGGGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      TCGCAGCTCGAGATCGTGCAGGAGCTCCTCAGCGACCCACCGACGACGTCGTCGAGCTC
GCCCCATCACCCGTCACCCCCACGTCAAGGTTCACGTTTTGCACGAGGGAACCGAGAAG
                                                                                                                                 grececerececegerecarereesecreseseses acereasecece erecetacaresec
                                                                                                                                                                                                                                                                                                           encesecres restricted as secretarion and contest of the secretarion of
                                                                                                                                                                                                                                                                                                                                                         GTCCGCCTCGTCGTCCTTGAGGCGCTCACCACTTCTTGAACCACCGCATCACGCCCATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      GAGGTCGTCCGCGCGCCATGGTCATCCGCGTCAACTCGCTCACGCGTGGCCACTCGGCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                AGGACTGAGGATGCAGTCAGCCTCCAGAAGGCGCTCATCGAGCACCAGCTCTGCGGCGTG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              AGGACTGAGGATGCAGTCAGCCTCCAGAAGGCGCTCATCGAGCACCAGCTCTGCGGCGTG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CGCGTCCAGAACGACGACGAGATCCGCGCACGCGTCGACAAGAGCGTCGACTTCCTCAAG
                                                                                                                                                                          GTCCCCTCCGCGGCTCCATCTCGGCGTCGGGCGACCTCAGCCCGCTCTCGTACATCGCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            100.0%; Score 2418.6; DB 6; Length 100.0%; Pred. No. 0; rative 0; Mismatches 0; Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          0,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            120
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         120
                                                                                                                                                                                                                                           720
                                                                                                                                                                                                                                                                                                                                                                                                                 660
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       600
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               180
                                                                                                                                                                                                                                                                                                                              660
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        600
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            300
                                                                780
                                                                                                                                                        720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          0
```

1980

1920

1980 2040 2040 2040 2100 2160

```
1741
                                                                                    1801
                                                                                                                                                                                                                                                                                   1681
                                                                                                                                                                                                                                                                                                                                                                                                                  1621
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1561
                 1801
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1621
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1561
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1501
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1501
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1441
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1441
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1381
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1321
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1321
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1141
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1141
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1261
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1261
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1201
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1201
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1081
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1081
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1021
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1021
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          961
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             961
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                901
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                901
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               841
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   841
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      781
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     781
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     721
                                                 ACGACGTACGTACGACCTCGAGCCGCGCTGGCACGCCTTCTCGTACGCGACCGGCACC
                                                                                                                                                                                CTCGACGTCAACGCACTTGCGCTCGAGGTCAAGAAGGCGCTCAACAAGCGTCTCGAGCAG
                                                                                                                                                                                                                                                                         CTTGCCAACCGGTCACTACCTTCGTCCAGCCCGCAGAGATGGGCAACCAGGCCGTCAAC
              ACGACGACGTACGACCTCGAGCCGCGCTGGCACGACGCCTTCTCGTACGCGACCGGCACC
                                                                                                                                         CTCGACGTCAACGCACTTGCGCTCGAGGTCAAGAAGGCGCTCAACAAGCGTCTCGAGCAG
                                                                                                                                                                                                                                                                                                                                                                                                        credecredacereracide accidence de concede de
                                                                                                                                                                                                                                                                                                                                                                                                                                                  CTCGCCTCGCACCTGTACTGCACGCTCCAGGCCGTCGACCTCCGCGCGATGGAGCTCGAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           rederredereredatere edece edece
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         TCGCTCGCTCTCATCTCCGCGCGCCGCACTGCCGAACGCCAACGACGTCCTTTCTCTCCTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           AACTATCACGGCAAGGGCTTGGACATTCACATCGCTGCGTACGCTTCGGAGCTCGGGCCAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             AACAAGCAGACCGCGCACGGCGGCAACTTCCAGGCGTCGGCTGTCTCGATTTCGATGGAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             AACTATCACGGCAAGGGCTTGGACATTCACATCGCTGCTTACGCTTCGGAGCTCGGCCAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   AAGACCAGGCTCGCACTCGCCCTCATCGGCAAGCTCAACTTCACGCAGTGCACCGAGTTG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                AAGACCAGGCTCGCACTCGCCCTCATCGGCAAGCTCAACTTCACGCAGTGCACCGAGTTG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             GTTGAGCACGAGGAGGACGTCAAGGTCAAGGACGACGACGACGACTTCTTCGCCAGGACCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     TACCCGCTCCGCACGTCGCCTCAGTTCCTCGGCCCCTCGTGGAGGACATGATGCACGCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CTGCACGACTCGCACATGCTCTCGCTCCTCTCGCAGGCCTTGACGGCTCTCACGGTTGAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               TACTCGACTCTCGCCTCGAGAACAACACGACGACGACAACCCGCTCCTCGACGTCGAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  TACTCGACTCTCTCGCTCGAGAACAACACGACGACAACCCGCTCCTCGACGTCGAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          TACCCGCTCCGCACGTCGCCTCAGTTCCTCGGCCCGCTCGTGGAGGACATGATGCACGCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             CCCGGCCAGGTCGAGGTCGCGCGCAACATCCGCACGCTCCTTTCCGGCTCGTCGTTTTGCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   CCCGGCCAGGTCGAGGTCGCGCGCAACATCCGCACGCTCCTTTCCGGCTCGTCGTTTTGCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               GCCATGGTCGGCCAGCAGGGCTCGTTCGCGCCCGTTCATCCACGACGTCTGCCGCCCCGCAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      AAGGAGGGTCTCGGTCTGGTCAACGGAACCGGCCGTCTCCCGCCTCGATGGCGACCCTCAGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        ATCATGTTTGCGCGCGAGGCCATCTCGCTCTTTGGTCTCGAGGCAGTCGTCCTCGGCCCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  ATCATGTTTGCGCGCGAGGCCATCTCGCTCTTTGGTCTCGAGGCAGTCGTCCTCGGCCCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        AAGGAGGGTCTCGGTCTGGTCAACGGAACGGCCGTCTCCGCCTCGATGGCGACCCTCAGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GGCGCCATCACCGGTCACCCCGACGTCAAGGTTCACGTTTTGCACGAGGGAACCGAGAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1260
          1860
                                                                             1860
                                                                                                                                                                                                         1800
                                                                                                                                                                                                                                                                                                                                                                                                           1680
                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1680
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1620
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1620
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1560
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1560
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1500
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1500
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1440
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1440
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1380
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1380
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1320
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1260
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1320
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1200
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1200
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1140
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1140
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1080
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1080
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1020
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1020
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         960
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     960
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            900
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        900
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           840
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           840
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          780
RESULT 3
ABA95281
ID ABA9
XX ABA95281
XX ABA9
XX ABA9
XX ABA9
XX ABA9
XX PAL
XX Cyt
XX
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       멍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                            exon
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          PAL; yeast; cytostatic;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ABA95251
                                                                          intron
                                                                                                                                                                                                                                     misc_feature
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Rhodotorula
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                10-JUN-2002
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             graminis
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         2401
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     2401
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        2341
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        2341
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       2281
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          2221
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             2161
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             2161
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               2101
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1921
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            2101
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      2041
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1981
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1981
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1861
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      standard;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CCTCCATACACATGTCGCCTTACTCTCTCGCCGTCATCACGTCTCTCAGTTCTTTCGTAT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            AGTTCAAAAAAAAAAAAAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CCCGCGTCTCTCGGTCAGTACACGTGTATAGAGCCTGGAATGGATTGCAAGTCTTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CCCGCGTCTCTCGGTCGTCAGTACACGTGTATAGAGCCTGGAATGGATTGCAAGTCTTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   GGCGCATCAACCACGTCCTCGTCAAGATGCTCGCGTAAGGCCCGAGCAAGCCTCGCCTA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   GGCGTGCAGCAGGAGACGATCGGGAGCAACGTCTCGCGCATCTACGAGGCCATCAAGGAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           GGCCGCATCAACCACGTCCTCGTCAAGATGCTCGCGTAAGGCCCGAGCAAGCCTCGCCTA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GGCGTGCAGCAGGAGCGATCGGGAGCAACGTCTCGCGCATCTACGAGGCCATCAAGGAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        creracroerroerecedaegaecroegoerecaegoececececeaegrerroere
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CTGTACTCGTTCGTGCGCGAGGAGCTCCGCGCGTGCAGGCGACGTGTTTGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       GTCGTCGAGCTCCTCTCGTCCTCGCCCTCTGCCAACGTCAACCCTTACTGCCGTCAACGCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        TGGAAGGTTGCCTCGGCCGAGAAGGCCATCTCGCTCACGCGCGAGGTGCGCAACCGCTTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    GTCGTCGAGCTCCTCGTCCTCGCCCTCTGCCAACGTCACCCTTACTGCCGTCAACGCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          graminis.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   phenylalanine ammonia lyase; cinnamic acid; cinnamate; ds;
anti-HIV; virucide; nootropic; dermatological; gene therapy.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         PAL genomic DNA sequence
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             (first
   /*tag= b
/note= "PAI DNA of strain ATCC 20804 at this position
contains the nucleotide C and the PAI DNA of strain KGX
39 contains the nucleotide A"
362. .448
/*tag= d
/number= 1
                                                                                                                                                                                                                                                                                                 /*tag= d
/product= "PAL polypeptide"
/pote= "contains introns"
1. .361
/*tag= c
                                                                                                                                                                                                                                                                  /number=
                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Location/Qualifiers
1. .2589
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               DNA;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             entry)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      2419
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     2419
```

2220 2220 2280 2280 2280 2340 2340 2400

성 유 성

유왕

A 40

25 A5 A5

Ś

유

중 음 중

유 성 유

8

유왕

improving the production of PAL, its analog or another optically active counsatural amino acid having PAL-like structure. The PAL polymucleotides care useful for treating a mammal having a disease, disorder or condition selected from phenylketonuria, cancer, human immunodeficiency virus infection and human cytomegalovirus infection. The present sequence crepresents a R. graminis PAL genomic DNA sequence X gequence 2741 BP; 441 A; 1019 C; 756 G; 524 T; 0 U; 1 Other; Query Match 75.5%; Score 1826.6; DB 6; Length 2741; Best Local Similarity 84.3%; Pred. No. 1.5e-280; Matches 2312; Conservative 2; Mismatches 1; Indels 426; Gaps 6;		R WPI; 2002-268973/31. R P-PSDB; ABB07690. R P-PSDB; ABB07690. T Phenylalanine ammonia lyase polypeptide and polynucleotide useful for treating mammal having disease or disorder from phenylketonuria, cancer, indeation. T indeation.	24-JUL-2000; 2000US-00624693.  (PCBU-) PCBU SERVICES INC.  Yoshida RK, Kootstra AB;		200208402-A2.	intron 19482007 /*teg= n /number= 6 exon 20082586 /*tag= o	/ Lag- 1 /number= 5 exon 18221947 /*tag= m /number= 6			/number= 2 exon	exon 449880  /*tag= e /number= 2 intron 881960  /*tag= f
Db 901 GCAGTGAGCTGTTTGAGAGAGTCTCCCAGTTTGCTGACGGACCGTCTTGTTCATGCGATTGCAG 960  Qy 830 TCCTCGGCCCGAAGGAGGTCTCGGTCTGGTCAACGGAACGGCCGTCTCGATTGCAG 889	30 ACCGGTCACCCCGACGTCARGGTTAGGTTTTGCACGAGGGAACCGAGAAGATCATGTTT 8 81 ACCGGTCACCCCGACGTCAAGGTTCACGTTTTGCACGAGGGAACCGAGAAGATCATGTTT 8 90 GCGCGCGAGGCCATCTCGCTTTTGGTCTCGAGGCAGTC	661 GTCGTCCTTGAGGCGCTCACCAACCTCTTGAACCACCGCATCAGCCCATCGTCCCCCCCT  670 GGCGGCTCATCTGCGGCGCGACCTCACCACCGCATCACACCGCATCGTCCCCCCT  [	QY 550 CGCGGCCCATGGTCATCCGCGTCACTCGCCTCACGCCACTCGGCCACTCGGCCGTCGGCCTC 609	Qy 490 TCCGYCTCGAGCGTCGAGGACGCGGCCTCGAGAACACGCTTCCGCTCGAGGTCGTC 549	OY 430 GATGCAGTCAGCCTCCAGAAGGCGCTCATCGAGCACCAGCTCTGCGGCGTGACGCCGACG 489	AGGACTGAG 42	301	, φ o ω	27	97 61 157	0 0

1950

2340 2010 2400 2070 1890

2220

2280

```
1771
                                                                                                                    1981
                                                                                                                                                                                                             1861
                            2101
                                                                                                                                           1618
                                                                                                                                                                                                                                                        1801
                                                                                                                                                                                                                                                                                                                          1484
                                                                                                                                                                                                                                                                                                                                                 1681
                                                                                                                                                                                                                                                                                                                                                                     1424
                                                                                                                                                                                                                                                                                                                                                                                            1621
                                                                                                                                                                                                                                                                                                                                                                                                                                         1561
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1501
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1441
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1381
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1162
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1321
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1261
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1130
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1201
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1070
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1141
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1010
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1081
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               950
    AAGAAGGCGCTCAACAAGCGTCTCGAGCAGGACGACGACGTACGACCTCGAGCCGCGCTGG
                         ACTCTCCTCCAGCAGCACCTCGGCACTGGCCTCGACGTCAACGCACTTGCGCTCGAGGTC
                                                                                  GCCGTCGACCTCCGCGCGATGGAGCTCGACTTCAAGAAGCAGTTCGACCCGCTTTCTCCCG
                                                                                                                AGCGACTGACGCGCGATCCTGAGCAGCTTCTCCGCCTCCACCTGTACTGCACGCTCCAG
                                                                                                                                                         GCCGAGGCCAACGACGTCCTTTCTCTCTCGTGCGTTCGTGTCGCAATGAGTCCCGACGCAAT
                                                                                                                                                                          GCCGTCGACCTCCGCGCGATGGAGCTCGACTTCAAGAAGCAGTTCGACCCGCTTCTCCCG
                                                                                                                                                                                                        cccschshshresechacchseccerchactcscrcscrcrchterecesesecscr
                                                                                                                                                                                                                                                                                                                                                         CCGAGGACCCGTCGCTCAACTATCACGGCAAGGGCTTGGACATTCACATCGCTGCTTACG
                                                                                                                                                                                                                                                                                                                                                                                                     TGTGCTGAATGTTCTCCTGCAGGTCGCACTCGCCCTCATCGGCAAGCTCAACTTCA
                                                                                                                                                                                                                                                   TGACTTCCTTTCCCTCTGTAGCTCGGCCACCTTGCCAACCCGGTCACTACCTTCGTCCAG
                                                                                                                                                                                                                                                                                                 CTTCGGAGGTGAGCCGTCGACGTTCTCCGCCGTCGCTCGTCCCCTTCAGCGCACCCAGGC
                                                                                                                                                                                                                                                                                                                                            ccdaddacccdrcdcrcaactarcacddcaadddcrrcdacarricacarcdcrracd
                                                                                                                                                                                                                                                                                                                                                                                                                                                                               CTGTCTCGATTTCGATGGAGAAGACCAGGTGCGTCTCTCGCTGCCTTCGTACTCCGATCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    ACCCGCTCCTCGACGTCGAGAACAAGCAGACCGCGCACGGGGGAACTTCCAGGCGTCGG
                                                                                                                                                                                                                                                                                                                          CTTCGG----
                                                                                                                                                                                                                                                                                                                                                                                          cecaerecaeceaerrecreaacecreccareaaceeceaecreccrreereccree
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CGTCGTTTGCCGTTGAGCACGAGGAGGAGGTCAAGGTCAAGGACGACGAGGGCATTCTTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      GCCGCCCGCACCCCGGCCAGGTCGAGGTCGCGCCAACATCCGCACGCTCCTTTCCGGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   CTCCGTCCGACCGGCGCGTCGAGACTTACGTTTTGCGTATCCAGTTCCTCGGCCCGCTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                GCCAGGACCGCTACCCGCTCCGCACGTCGCCTCAGGTTCGTCCCCTCTCTCCCCCTTCCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     AGCTCGGCCACCTTGCCAACCCCGGTCACTACCTTCGTCCAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    -CAGTTCCTCGGCCCGCTCG 1180
    1830
                                                                                           1710
                                                                                                                2040
                          2160
                                                                     2100
                                                                                                                                       1650
                                                                                                                                                                                    1617
                                                                                                                                                                                                         1920
                                                                                                                                                                                                                               1590
                                                                                                                                                                                                                                                      1860
                                                                                                                                                                                                                                                                          1530
                                                                                                                                                                                                                                                                                                 1800
                                                                                                                                                                                                                                                                                                                        1489
                                                                                                                                                                                                                                                                                                                                            1740
                                                                                                                                                                                                                                                                                                                                                                   1483
                                                                                                                                                                                                                                                                                                                                                                                          1680
                                                                                                                                                                                                                                                                                                                                                                                                              1423
                                                                                                                                                                                                                                                                                                                                                                                                                                     1620
                                                                                                                                                                                                                                                                                                                                                                                                                                                            1363
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1325
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1500
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1380
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1161
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1260
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1129
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1200
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1069
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1140
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1009
  RESULT 4
AAD45823
ID AAD4
XX AAD4
AC AAD4
AC AAD4
XX Yeas
KW Yeas
KW Canc
KW huma
OS Rhod
FT CDS
FT CDS
FT intr
FT intr
FT intr
FT exon
FT exon
FT exon
FT intr
                                                                                                                                                                                                                                                                                                                                                                                                                                             B
                                                                                                                                                                                                                                                                                                                                                                                                                       Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             망
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               γQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         멍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                    exon
                                                                                exon
                                                                                                                                                                                                        Rhodotorula
                                                                                                                                                                                                                          Yeast; phenylalanine ammonia lyase; PAL; EC 4.3.1.5; phenylketonuria; cancer; human immunodeficiency virus infection; HIV; gene therapy; hCMV; human cyromegalovirus infection; cytostatic; virucide; gene; ds.
                                                                                                                                                                                                                                                                        Rhodotorula graminis PAL genomic
               intron
                                                                                                    intron
                                                                                                                                                                                                                                                                                                27-DEC-2002
                                                                                                                                                                                                                                                                                                                                            AAD45823
                                                         intron
                                                                                                                                                                                                                                                                                                                                                                                                     2701
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             2401
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                2191
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      2521
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           2131
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         2341
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1951
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       2281
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1891
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  2221
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             2161
                                                                                                                                                                                                                                                                                                                                            standard;
                                                                                                                                                                                                                                                                                                                                                                                                              CCGTCATCACGTCTCTCAGTTCTTTCGTATCCCGCGTCTCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GTGCAGGCGCGCGCGGCGACGTGTTTGTCGGCGTGCAGCAGGAGACGATCGGGAGCAAC
                                                                                                                                                                                                                                                                                                                                                                                                 ccercarcacercreaerrerrreerareececercrer
                                                                                                                                                                                                                                                                                                                                                                                                                                                        CGACGTCGTGTGGCCAAGAACGGACTTTCCTCCATACACATGTCGCCTTACTCTCTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GTCTCGCGCATCTACGAGGCCATCAAGGACGGCCGCATCAACCACGTCCTCGTCAAGATG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 GTCTCGCGCATCTACGAGGCCATCAAGGACGGCCGCATCAACCACGTCCTCGTCAAGATG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            GCCAACGTCACCCTTACTGCCGTCAACGCGTGGAAGGTTGCCTCGGGCCGAGAAGGCCATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             CACGACGCCTTCTCGTACGCGACCGGCACCGTCGAGCTCCTCTCGCTCCTCGCCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                             CGACGTCGTGTCGTGCCAAGAACGGACTTTCCTCCATACACATGTCGTCTTACTCTCTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          TCGCTCACGCGAGGTGCGCAACCGCTTCTGGCAGACGCCGTCTTCGCAGGCGCCGGCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        TCGCTCACGCGCGAGGTGCGCCAACCGCCTTCTGGCAGACGCCGTCTTCGCAGGCGCCCGGCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       GCCAACGTCACC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CACGACGCCTTCTCGTACGCGACCGGCACCGTCGTCGTCGTCGTCCTCTCT
                                                                                                                                                                                                       graminis.
                                                                                                                                                                                                                                                                                               (first entry)
                                                                                            /*tag= a
/product= "PAL protein"
/EC number= "4.3.1.5"
1. .361
1*tag= b
362..448
/*tag= c
449. .880
/*tag= d
881. .960
/*tag= e
9/*tag= f
/*tag= f
1296. .1364
/*tag= g
                                                                                                                                                                                Location/Qualifiers
                                                                                                                                                                                                                                                                                                                                            DNA;
                                                                                                                                                                                                                                                                                                                                            2741
                                                                                                                                                                                                                                                                                                                                           BP
                                                                                                                                                                                                                                                                         DNA.
                                                                                                                                                                                                                                                                                                                                                                                                  2741
                                                                                                                                                                                                                                                                                                                                                                                                                        2351
```

2640

2460 2130 2520 2190 2580 2250

2310 2700 B 8

A 40

유 상 유 상 상 유 상 유 상

유 성

유

유 상 유 상 명 성 상 명 성 명 δ

8 8

S

```
Query Match
Best Local S
Matches 2312
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    The present invention relates to yeast (e.g. Rhodotorula) phenylalanine ammonia lyase (PAL, EC 4.3.1.5) proteins and polynucleotides encoding such proteins. PAL sequences are useful for producing L-phenylalanine. They are useful for treating mammals having diseases, disorders or conditions that would benefit from treatment with PAL proteins such as phenylketonuria, cancer, human immunodeficiency virus infection (HIV) or human cytomegalovirus (hCMV) infection. Sequences of the invention are also used in gene therapy. The present sequence is R. graminis PAL protein and present sequence is R. graminis PAL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  exon
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            exon
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 exon
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           exon
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Novel isolated and purified Rhodotorula phenylalanine ammonia lyase polypeptide, useful for treating a mammal having phenylketonuria, cancer, human immunodeficiency virus or human cytomegalovirus infection.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            24-JUL-2000; 2000US-00624693
24-JUL-2001; 2001WO-US023270
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    WPI; 2002-690616/74.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           US2002102712-A1
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                terminator
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     intron
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Sequence 2741 BP; 441 A; 1019 C; 756 G;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Claim 4; Page 50-53; 74pp; English.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Yoshida RK,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 24-AUG-2001; 2001US-00939408
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        01-AUG-2002
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               intron
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         intron
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              (PCBU-) PCBU SERVICES INC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     2312;
                                                                                                                                                                                                                                                                                                                                                   121
                                                                                                                                                                                                                                                                                                                                                                                                                                          157
241
                                                                                  277
                                                                                                                                                                         181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         37
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               97
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ш
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Similarity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              ATGGCCCTTCCTTGGACTCGCTCGCCACCACGCTCGCCAACGGCTTTACCAACGGCTCG
                                                                                                                                                                                                                                                                                                                                              CTCGATGGCCACGCGCACCAGTCGCAGCTCGAGATCGTGCAGGAGCTCCTCAGCGAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               CACGCCGCTCCGACCAAGTCGGCTGCGGGGCCCCACTTCGGCTCTCCGCCGCACGCCCGGC
                                                                         CTCGATGGCCACGCCGCGCACCAGTCGCAGCTCGAGATCGTGCAGGAGCTCCTCAGCGAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             CACGCCGCTCCGACCAAGTCGGCTGCGGGCCCCACTTCGGCTCTCCGCCGCACGCCCGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Argacmocrirochioaderoacioaciócacaciones cadacación raccados de consecuencios de consecuencion de consecuencios de consecuencion de consecuencios de consecuencio
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Kootstra
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                /*tag= k
1822. .1947
/*tag= 1
1948. .2007
/*tag= m
2008. .2589
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       /*tag=
2587. .
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 /*tag=
1587. .
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          /*tag=
1749. .
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              75.5%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    .1529
|= .1586
|= .i
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      .2589
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          .1821
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 .1748
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     2;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Score 1826.6; DB 6; Pred. No. 1.5e-280; 2; Mismatches 1;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               524 T; 0 U; 1 Other;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Indels 426; Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Length 2741
                                                                                           336
                                                                                                                                                                                  240
                                                                                                                                                                                                                                                                          276
                                                                                                                                                                                                                                                                                                                                                                 180
                                                                                                                                                                                                                                                                                                                                                                                                                                                   216
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           120
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             156
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       96
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              0
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    뮹
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        뮹
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         망
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        맑
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     망
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Б
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 片
                                                                                                                                     Ş
                                                                                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                                          Š
                                                                                                                                                                                                                                                                                                                                                                                                               먕
                                                                                                                                                                                                                                                                                                                                                                                                                                                                          8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                       밁
                                                                                                                                                                                                                                                                                                                        1130
                                                                                                                                                                                                                                                                                                                                                                                                                   1201
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1070
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1141
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1010
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1081
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1021
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      541
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  430
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         421
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 396
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           337
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         950
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               890
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      961
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             830
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                901
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       829
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         841
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            790
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   781
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      730
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        721
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                670
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       661
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     610
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 601
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               550
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             490
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    481
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        GATGCAGTCAGCCTCCAGAAGGCGCTCATCGAGCACCAGCTCTGCGGCGTGACGCCGACG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GATGCAGTCAGCCTCCAGAAGGCGCTCATCGAGCACCAGCTCTGCGGCGTGACGCCGACG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         gerragaegergeegererragaggerriteggregeregeetegeetegeetegeetegaegaetegae
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               GTGCGTTCCGAGACGAGAGGCGGAAATCTCGGGATGCCGCAGCGCTGAACGCTGACACTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 TCCGYCTCGTCCTTCAGCGTCGGACGCGCCTCGAGAACACGCTTCCGCTCGAGGTCGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  TCCTCGGCCCGAAGGAGGGTCTCGGTCTGGTCAACGGAACGGCCGTCTCCGCCTCGATGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      GCAGTGAGCTGTTCGAGAGTCTCCCCAGTTTGCTGACTGCCCTTTGTTCATGCGATTGCAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          accegrcacccceacercaaegricacerritecaceaegaaegaacceaegaaeatcarerri
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      ACCGGTCACCCCGACGTCAAGGTTCACGTTTTGCACGAGGAACCGAGAAGATCATGTTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             CGCGGCTCCATCTCGGCGTCGGGCGACCTCAGCCCGCTCTCGTACATCGCCGGCGCCATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CGCGGCTCCATCTCGGCGTCGGGCGACCTCAGCCCGCTCTCGTACATCGCCGGCGCCATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  gregreerreaggegereaceaacrrerreaaceacegeareacecearegreere
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GTCGTCCTTGAGGGGGTCACCAACTTCTTGAACCACCGCATCACGCCCATCGTCCCCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CGCGGCGCCATGGTCATCCGCGTCAACTCGCTCACGCGTGGCCACTCGGCCGTCCGCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      TCCGTCTCGTCCTTCAGCGTCGGACGCGGCCTCGAGAACACGCTTCCGCTCGAGGTCGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     TCACGGTGGAGGCCATGGTCGGCCAGCAGGCTCGTTCGCGCCGTTCATCCACGACGTCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CGACCCTCAGTCTGCACGACTCGCACATGCTCTCGCTCTCGCAGGCCTTGACGGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   CGACCCTCAGTCTGCACGACTCGCACATGCTCTCGCTCCTCTCGCAGGCCTTGACGGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          recreeseceanses as a recreese estables e
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            GCGCGCGAGGCCATCTCGCTCTTTGGTCTCGAGGCAGTC------
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ceceeceanie realization de la la constant de la con
                                                  CTCCGTCCGACCGGCGCGCGTCGAGACTTACGTTTTGCGTATCCAGTTCCTCGGCCCGCTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    GCCGCCGCACCCCGGCCAGGTCGAGGTCGCGCGCAACATCCGCACGCTCCTTTCCGGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              TCACGGTGGAGGCCATGGTCGGCCAGCAGGGCTCGTTCGCGCCGTTCATCCACGACGTCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GCGCGCGAGGCCATCTCGCTCTTTGGTCTCGAGGCAGTCGGTACGTCGCGAGTCCTGACT
                                                                                                                                                                                                                                                                                       GCCAGGACCGCTACCCGCTCCGCACGTCGCCT------
                                                                                                                                                                                                                                                                                                                                                                                                               CGTCGTTTGCCGTTGAGCACGAGGAGGAGGTCAAGGTCAAGGACGACGAGGGCATTCTTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                               CGTCGTTTGCCGTTGAGCACGAGGAGGAGGAGGTCAAGGTCAAGGACGACGACGGCATTCTTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    ecceccecaciones de la constanta de la constant
                                                                                                                                                                                                                                     GCCAGGACCGCTACCCGCTCCGCACGTCGCCTCAGGTTCGTCCCCTTCTCTCCCCTTCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     -----GGGTTTCGGTGGCTCGGCCGACACGAGGACTGAG
                                                                                                                                                            ---CAGTTCCTCGGCCCGCTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           549
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     489
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        600
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   429
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1129
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1200
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1140
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1009
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1080
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 949
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           889
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        395
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1069
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1020
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       900
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    789
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  729
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       669
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              660
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 609
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             960
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     829
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 840
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           780
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                720
                                                                              1380
                                                                                                                                                                     1180
                                                                                                                                                                                                                                                   1320
                                                                                                                                                                                                                                                                                                                                          1161
                                                                                                                                                                                                                                                                                                                                                                                                                                 1260
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              828
```

멼

밁 Ş 망 Ś

Ş

5 밁

```
B
                                δ
                                                    뮍
                                                                    8
                                                                                     В
                                                                                                      Ş
                                                                                                                          B
                                                                                                                                        Ş
                                                                                                                                                              8 8
                                                                                                                                                                                           Дb
                                                                                                                                                                                                             δ
                                                                                                                                                                                                                                    유성
                                                                                                                                                                                                                                                                 8 8
                                                                                                                                                                                                                                                                                                    뮍
                                                                                                                                                                                                                                                                                                                      Ş
                                                                                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                                                                       5
                                                                                                                                                                                                                                                                                                                                                                         9
                                                                                                                                                                                                                                                                                                                                                                                            Ś
                                                                                                                                                                                                                                                                                                                                                                                                           유 성
                                                                                                                                                                                                                                                                                                                                                                                                                                               용 성 상
양 성 양
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    ДĎ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      8 B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  8 8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   В
                    2401
                                                                                          2281
                                                                                                                            2221
                                                                        1951
                                                                                                                                                               2161
                                                                                                                                                                                1771
                                                                                                                                                                                                 2101
                                                                                                                                                                                                                   1711
                                                                                                                                                                                                                                     2041
                                                                                                                                                                                                                                                     1651
                                                                                                                                                                                                                                                                        1981
                                                                                                                                                                                                                                                                                        1618
                                                                                                                                                                                                                                                                                                          1921
                                                                                                                                                                                                                                                                                                                                                                                                                   1741
                                                                                                                                                                                                                                                                                                                                                             1531
                                                                                                                                                                                                                                                                                                                                                                               1801
                                                                                                                                                                                                                                                                                                                                                                                                 1490
                                                                                                                                                                                                                                                                                                                                                                                                                                    1484
                                                                                                                                                                                                                                                                                                                                                                                                                                                      1681
                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1424
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1621
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1364
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1561
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1326
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1501
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1301
                                                                                                                                                                                                                                                                                                                           1591
                                                                                                                                                                                                                                                                                                                                            1861
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1441
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1381
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1181
GTGCAGGCGCGCGCGGCGACGTGTTTGTCGGCGTGCAGCAGGAGACGATCGGGAGCAAC
                 rederekededadardedekakeerrerdadadadeeerrerredadadadeeerdada
                                                              TCGCTCACGCGCGAGGTGCGCAACCGCTTCTGGCAGACGCCGTCTTCGCAGGCGCCGGCG
                                                                                      GCCAACGTCACCCTTACTGCCGTCAACGCGTGGAAGGTTGCCTCGGCCGAGAAGGCCATC
                                                                                                 GCCAACGTCACCCTTACTGCCGTCAACGCGTGGAAGGTTGCCTCGGCCGAGAAGGCCATC
                                                                                                                                     CACGACGCCTTCTCGTACGCGACCCGGCACCGTCGTCGAGCTCCTCTCTCGCCCTCT
                                                                                                                                                                        AAGAAGGCGCTCAACAAGCGTCTCGAGCAGCGACGACGACGTACGACCTCGAGCCGGGCTGG
                                AGAAGGCGCTCAACAAGCGTCTCGAGCAGACGACGTACGACCTCGAGCCGCCTGG
                                                                                                                                                                                                            ACTOTOCTCCAGCAGCACCTCGGCACTGGCCTCGACGTCAACGCACTTGCGCTCGAGGTC
                                                                                                                                                                                                                                 GCCGTCGACCTCCGCGCGATGGAGCTCGACTTCAAGAAGCAGTTCGACCCGCTTCTCCCG
                                                                                                                                                                                                                                             GCCGTCGACCTCCGCGCGATGGAGCTCGACTTCAAGAAGCAGTTCGACCCGCTTCTCCCG
                                                                                                                          CACGACGCCTTCTCGTACGCGACCGGCACCGTCGTCGAGCTCCTCTCGTCCTCGCCCCTCT
                                                                                                                                                                                               ACTOTOCTOCAGOAGOTOGGOACTGGCCTCGACGTCAACGCACTTGCGCTCGAGGTC
                                                                                                                                                                                                                                                                                GCCGAGGCCAACGACGTCCTTTCTCTCGTGCGTTCGTGTCGCAATGAGTCCCGACGCAAT
                                                                                                                                                                                                                                                                                                                  TGACTTCCTTTCCCTCTGTAGCTCGGCCACCTTGCCAACCCGGTCACTACCTTCGTCCAG
                                                                                                                                                                                                                                                                                                                                                                                      -----AGCTCGGCCACCTTGCCAACCCGGTCACTACCTTCGTCCAG 1530
                                                                                                                                                                                                                                                                                                                                                                                                               cceaegacccercecreaacrarcacescaaegecrregacarreacarcecrecrrace
                                                                                                                                                                                                                                                                                                                                                                                                                                                              CCGAGGACCCGTCGCTCAACTATCACGGCAAGGGCTTGGACATTCACATCGCTGCTTACG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     TGTGCTGAATGTTCTTCTCCTGCAGGCTCGCACTCGCCCTCATCGGCAAGCTCAACTTCA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CTGTCTCGATTTCGATGGAGAAGACCAGGTGCGTCTCTCGCTGCCTTCGTACTCCGATCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     ACCCGCTCCTCGACGTCGACGAACAAGCAGACCGCGCGCACGGCGGCAACTTCCAGGCGTCGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                TGGAGGACATGATGCACGCCTACTCGACTCTCCCCCGAGAACAACACGACGACGACA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          TGGAGGACATGATGCACGCCTACTCGACTCTCTCGCTCGAGAACAACACGACGACGACGACG
2130
                 2460
                                  2070
                                                   2400
                                                                    2010
                                                                                       2340
                                                                                                        1950
                                                                                                                         2280
                                                                                                                                          1890
                                                                                                                                                            2220
                                                                                                                                                                            1830
                                                                                                                                                                                              2160
                                                                                                                                                                                                                1770
                                                                                                                                                                                                                                 2100
                                                                                                                                                                                                                                                   1710
                                                                                                                                                                                                                                                                     2040
                                                                                                                                                                                                                                                                                     1650
                                                                                                                                                                                                                                                                                                       1980
                                                                                                                                                                                                                                                                                                                         1617
                                                                                                                                                                                                                                                                                                                                                           1590
                                                                                                                                                                                                                                                                                                                                                                             1860
                                                                                                                                                                                                                                                                                                                                                                                                                                 1489
                                                                                                                                                                                                                                                                                                                                                                                                                                                   1740
                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1483
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1680
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1423
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1620
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1560
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1325
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1500
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1440
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1240
```

```
밁
                                                                                                                                                                                                                                                                                                               5
     8
                                                                             Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                        B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         S
     2701
                                                                                                                                                                                                                            2641
                                                                                                                                                                                                                                                                                                                                             2251
                                                                                                                                                                                                                                                                                                                                                                                                                                                        2581
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             2191
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          2521
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                2461
CCGTCATCACGTCTCTCAGTTCTTTCGTATCCCGCGTCTCT
                                                                                                                                                                                                                                                                                 CGACGTCGTGTCGTGCCAAGAACGGACTTTCCTCCATACACATGTCGCCTTACTCTCTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   GTCTCGCGCATCTACGAGGCCATCAAGGACGGCCGCATCAACCACGTCCTCGTCAAGATG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   GTCTCGCGCATCTACGAGGCCATCAAGGACGGCCGCATCAACCACGTCCTCGTCAAGATG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CCGTCATCACGTCTCTCAGTTCTTTCGTATCCCGCGTCTCT
                                                                                                                                                                                                                      CGACGTCGTCGTCCAAGAACGGACTTTCCTCCATACACATGTCGTCTTACT
                                                                                                                                                                                                                                                                                                                                                                                                                                      cresesta a seccesa de la accerció en la consecución de la companya de la consecución del consecución de la consecución d
2741
                                                                                                     2351
                                                                                                                                                                                                                                                                                                                                 2310
                                                                                                                                                                                                                      2700
                                                                                                                                                                                                                                                                                                                                                                                                                                            2640
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              2580
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   2190
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    2520
```

Yeast; phenylalanine ammonia lyase; PAL; EC 4.3.1.5; phenylketonuria; cancer; human immunodeficiency virus infection; HIV; gene therapy; hCMV; human cytomegalovirus infection; cytostatic; virucide; ds. Rhodotorula graminis Yeast phenylalanine ammonia lyase DNA #2 27-DEC-2002 AAD45824 standard; (first Location/Qualifiers DNA; entry)

RESULT 5
AAD45824
AID 4A5824
AC AAD4
AC AAD4
AC Yeas
KW Yeas
KW Yeas
KW Canc
K /transl\_except= (pos:73..75, aa:Xaa)
/note= "Xaa corresponds to Thr, Pro, Se;
/transl\_except= (pos:79..81, aa:Xaa)
/note= "Xaa corresponds to Pro, Ser"
/transl\_except= (pos:82..84, aa:Xaa)
/note= "Xaa corresponds to Ala, Pro"
/transl\_except= (pos:100..102, aa:Xaa)
/note= "Xaa corresponds to Thr"
/transl\_except= (pos:106..108, aa:Xaa)
/note= "Xaa corresponds to Arg, Ser"
/transl\_except= (pos:115..117, aa:Xaa)
/note= "Xaa corresponds to Ala, Pro, Ser
/transl\_except= (pos:118..120, aa:Xaa)
/note= "Xaa corresponds to Ala, Pro, Ser
/transl\_except= (pos:118..120, aa:Xaa)
/note= "Xaa corresponds to Arg, Gly, Txr
/transl\_except= (pos:118..124, aa:Xaa)
/note= "Xaa corresponds to Yys, Thr, Met

Gln\_except= "Yaa corresponds to Yys, Thr, Met /transl\_except= (pos:13...15, aa:Xaa)
/note= "Xaa corresponds to Val, Leu, Phe"
/transl\_except= (pos:34...36, aa:Xaa)
/note= "Xaa corresponds to Val, Leu, Phe"
/transl\_except= (pos:46...48, aa:Xaa)
/note= "Xaa corresponds to Val, Leu, Phe"
/transl\_except= (pos:49...51, aa:Xaa)
/note= "Xaa corresponds to Thr, Ala, Ser"
/transl\_except= (pos:55...57, aa:Xaa)
/note= "Xaa corresponds to Gly"
/transl\_except= (pos:55...57, aa:Xaa) Gln, Pro, Leu"
/transl\_except= (pos:160.
/note= "Xaa corresponds t /transl\_except= (pos:58. .60, aa:Xaa)
/note= "Xaa corresponds to Ser, Leu o /product= "PAL protein /EC\_number= "4.3.1.5" ω ť aa:Xaa)
Pro, Ser"
aa:Xaa)
Gly, Trp"
aa:Xaa)
Thr, Met, aa:Xaa) aa:Xaa) aa:Xaa) g Ser" an Glu, in-frame stop

```
/trans1 except= (pos:715. .717, aa:Xaa)
/trans1 except= (pos:721. .723, aa:Xaa)
/trans1 except= (pos:721. .723, aa:Xaa)
/note= "Xaa corresponds to Val"
/trans1 except= (pos:724. .726, aa:Xaa)
/note= "Xaa corresponds to Val, Leu, Phe"
/trans1 except= (pos:736. .738, aa:Xaa)
/note= "Xaa corresponds to Lys, Asn, Thr"
/trans1 except= (pos:751. .753, aa:Xaa)
/note= "Xaa corresponds to Tyr, Ser, Phe"
/trans1 except= (pos:775. .777, aa:Xaa)
/note= "Xaa corresponds to Teu, Phe"
/trans1 except= (pos:913. .915, aa:Xaa)
/note= "Xaa corresponds to Leu, Phe"
/trans1 except= (pos:955. .957, aa:Xaa)
/note= "Xaa corresponds to Lou"
/trans1 except= (pos:955. .957, aa:Xaa)
/note= "Xaa corresponds to Pos"
/trans1 except= (pos:1036. .1038, aa:Xaa)
/note= "Xaa corresponds to Pys, Arg, Thr, Gl
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               /note= "Xaa corresponds to Lys, As /note= "Xaa corresponds to Lys, As /note= "Xaa corresponds to Arg, Si /note= "Xaa corr
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           /transl_except= (pos:475...477, aaixaa)
/note= "Xaa corresponds to Gly"
/rotansl_except= (pos:547...549,
/note= "Xaa corresponds to Thr"
/transl_except= (pos:667...669, aaixaa)
/note= "Xaa corresponds to Pro"
/transl_except= (pos:673...675, aaixaa)
/note= "Xaa corresponds to Ser"
/note= "Xaa corresponds to Ser, Thr, Ile,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           /transl_except= (pos:340...342, a /note= "Xaa corresponds to Arg, S /transl_except= (pos:349...351, a /note= "Xaa corresponds to Gly" /transl_except= (pos:442...444, a /note= "Xaa corresponds to Val" /note= "Xaa corresponds to Val"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    /note= "Xaa corresponds to Pro"
/note= "Xaa corresponds to Pro"
/transl_except= (pos:457. .459, aa:Xaa)
/note= "Xaa corresponds to Ile, Val, Phe"
/note= "Xaa corresponds to Ide, Val, Phe"
/note= "Xaa corresponds to Ide, Val, Phe"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           note= "Aaa vor-vos 177. .279, /transl except= (pos:277. .279, /note= "Xaa corresponds to Asp, /note= "Question of the corresponds" | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 1888 | 18
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    note= "Add UTTANS! except= (pos:196. .198, /trans! except= (pos:196 . .198, /note= "Xaa corresponds to Ile, /note= "Xaa corres
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          /mote= "Xaa corresponds to Lys,
/note= "Xaa corresponds to Glu,
/mote= "Xaa corresponds to Glu,
                                                                                                                                                                                                                                                                                                                                                                                   /note=
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            /note= "Xaa corresponds to Glu, Asp"
/trans1 except= (pos:469. .471, aa:Xaa)
/note= "Xaa corresponds to Ser, Gly, Arg"
/trans1_except= (pos:475. .477, aa:Xaa)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     'notee "Ada corresponds to Glu,
/notee "Xaa corresponds to Glu,
/notee "Xaa corresponds to Hu,
'notee "Yaa corresponds to Hu
                                                                                                        /transl_except= (pos:1231. .1233, aa:Xaa)
/note= "Xaa corresponds to Lys, Thr, Met"
/transl_except= (pos:1261. .1263, aa:Xaa)
/note= "Xaa corresponds to Thr, Ala, Ser"
/transl_except= (pos:1369. .1371, aa:Xaa)
/note= "Xaa corresponds to Leu"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              transl_except= (pos:334..336,
note= "Xaa corresponds to Asp,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    transl_except= (pos:325. .327, note= "Xaa corresponds to Thr,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      note= "Xaa corresponds to Gly"
| transl except= (pos:259. .261,
| note= "Xaa corresponds to Thr,
| transl_except= (pos:277. .279,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  transl_except= (pos:226.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    note= "Xaa corresponds t
                                    /transl_except= (pos:1372.
/note= "Xaa corresponds to
                                                                                                                                                                                                                                                                                                                                                                                   a stop
                                                                                                                                                                                                                                                                                                                                                                                   codon"
.1398, aa:Xaa)
                                                                             .1374, aa:Xaa)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       aa:Xaa)
Asn"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ala, Ser"
aa:Xaa)
His, Tyr"
aa:Xaa)
Ser"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              aa:Xaa)
Pro, Ser"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    aa:Xaa)
Thr, Ile,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Asp, va
aa:Xaa)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  aa:Xaa)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        aa:Xaa)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          aa:Xaa)
Ser"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      aa:Xaa)
Ala"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             aa:Xaa)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                aa:Xaa)
Asp, Val"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            aa:Xaa)
                                                                                                                                                                                                                                                                                                                                                                                                                                Gln,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Gly, Ala, Val,
                                                                                                                                                                                                                                                                                                                                                                                                                                         Pro,
         Novel isolated and purified Rhodotorula phenylalanine ammonia lyase polypeptide, useful for treating a mammal having phenylketonuria, cancer, human immunodeficiency virus or human cytomegalovirus infection.
                                                                                                                                                                                                                                                                                                               WPI; 2002-690616/74.
P-PSDB; AAE27943.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 24-JUL-2000; 2000US-00624693.
24-JUL-2001; 2001WO-US023270.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           24-AUG-2001; 2001US-00939408
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      01-AUG-2002.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   US2002102712-A1.
                                                 Claim 7; Page 53-56; 74pp; English
                                                                                                                                                                                                                                                                                                                                                                                                                                                  Yoshida RK,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    (PCBU-) PCBU SERVICES INC.
                                                                                                                                                                                                                                                                                                                                                                                                                                              Kootstra AB
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           /transl_except= (pos:1498..1500,
/transl_except= (pos:1552..1554,
/note= "Xaa corresponds to Thr"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            /transl_except= (pos:1606.
/note=_"Xaa corresponds to
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        transl_except= (pos:1477./note= "Xaa corresponds to
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  transl_except= (pos:145
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    note= "Xaa corresponds to Pro"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               /transl except= (pos:1978. .1980, aa /note= "Xaa corresponds to Thr. Ala. /transl_except= (pos:2122. .2124, aa /note= "Xaa corresponds to Asn, Ser,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         transl_except= (pos:2128. .2130, aa:Xaa)/note= "Xaa corresponds to Ser, Arg, Cys"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Transl except (pos:1939. 1941, aa:Xaa)
(mote "Xaa corresponds to Thr. Pro, Ser'
(transl except (pos:1948. 1950, aa:Xaa)
(note "Xaa corresponds to Ala, Pro, Ser'
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           'transl_except= (pos:1927.
'note= "Xaa corresponds to
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           codon"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       except= (pos:1459.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1 to Val"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 to Val"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       to Gly
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Glu, Asp, Gln,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              aa:Xaa)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    aa:Xaa)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             aa:Arg
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   aa:Xaa
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    aa:Xaa)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         His, Tyr or
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Leu"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Asp,
```

8	8 8	go dy	Qy db	dg VQ	P Q	9G VQ	g &	B 82	p Qy	D Qy	g &	g Qy	90 VQ	g 99	B 8	dg VQ	Que: Best Mat	000
ь	937 GCCTTGACGGCTCTCACGGTGGAGGCCATGGTCGGCCAGCAGGCTCGTTCGGCGCCGTTC 996	877 TCCGCCTCGATGGCGACCCTCAGTCTGCACGACTCGCACATGCTCTCGCTCTCTCGCAG 936	817 CTCGAGGCAGTCGTCCTCGGCCCGAAGGAGGGTCTCGGTCTGGTCAACGGAACGGCCGTC 876	757 GTTTTGCACGAGGGAACGAGAAGATCATGTTTGCGCGCGAGGCCATCTCGCCTCTTTGGT 816     :   :   :	697 CTCAGCCCGCTCTCGTACATCGCCGGCGCCATCACCGGTCACCCCGACGTCAAGGTTCAC 756	637 TTGAACCACCGCATCACGCCATCGTCCCCCTCCGCGGCTCCATCTCGGCCGTCGGCCGAC 696	577 TGGCTCACGCGTGGCCACTCGGCCGTCCGTCGTCGTCCTTGAGGCGCTCACCAACCTTC 636	517 GGCCTCGAGAACACGCTTCCGCTCGAGGTCGTCCGCGGCGCCATGGTCATCCGCGTCAAC 576	457 ATGGAGCACCAGCTCTGGGGCGTGACGCCGACGTCCGYCTCGTCCTTCAGCGTCGGACGC 516	397 GGTTTCGGTGGCTCGGCCGACACGAGGACTGAGGATGCAGTCAGCCTCCAGAAGGCGCTC 456	337 GACAAGAGCGTCGACTTCCTCAAGGCCCAGCTTCAGAACTCGGTCTACGGAGTCACCACG 396      :  :       :  :     : :     :	277 GCCGCCCGCAAGGGCGCAAGGTCCGCGTCCAGAACGACGACGAGATCCGCGCACGCGTC 336	217 CCCACCGACGACGTCGTCGAGCTCAGCGGGTACAGCCTCACCGTCGCGTGACGTTGTCGGC 276	157 CTCGATGGCCACGCGCGCACCAGTCGCAGCTCGAGATCGTGCAGGAGCTCCTCAGCGAC 216	97 CACGCCGCTCCGACCAAGTCGGCTGCGGGCCCCACTTCGGCTCTCCGCCGCACGCCCGGC 156	37 ATGGCCCCTTCCTTGGACTCGCTCGCCACGCTCGCCAACGGCTTTACCAACGGCTCG 96	Query Match 70.4%; Score 1704; DB 6; Length 2163; Best Local Similarity 84.0%; Pred. No. 3.9e-261; Matches 1817; Conservative 109; Mismatches 236; Indels 0; Gaps 0;	The present invention relates to yeast (e.g. Rhodotorula) phenylalanine ammonia lyase (PAL; EC 4.3.1.5) proteins and polynucleotides encoding such proteins. PAL sequences are useful for producing L-phenylalanine.
Ş	P &	9 4 5 5	da VQ	D 29	B &	da da	) B Q	g 40	Db QY	מם מס	Qy dd	ob Oy	dd Qy	γ <sub>0</sub>	2	) B &	B &	D D
2077 GCGCGCCGCGGCGACGTTTTGTCGGCGTGCAGCAGGAGCAACGTCTCG 2136	2017 TACCTCTCGCGCGCACGCGCGTCCTGTACTCGTTCGTGCGCGAGGAGCTCGGCGTGCAG 2076	1957 ACGCGCAGGTGCGCAACCGCTTCTGGCAGACGCCGTCTTCGCAGGCGCGCGC	97 61	1 7			ACCICCGCGCGATGGACTCGACTICAAGAAGCAGTTCGACCGCGTTCTCCCGACTCTC	GCCAACGACGICCTTITCTCTCTCTCCGCCTCGCACCTGTACTGCACGCTCCAGGCCGTC	537 GAGANGGGAACCAGGCCGTCAACTCGCTCTCATCTCCGCGCGCGC	441	381	357 AACTTCACGCAGTGCACCGAGTTGCTCAACGCTGCCATGAACCGCGGGCTGCCTTCGTGC	261	201	1	17 GAGGCATTCTTCGCCAGGACCGCTACCCGCTCCGCACGTCGCCTCAGTTCCTCGGCCCG 1	μ .	

ž 岁 ž 岁

Я

```
ABSULT 6
ABA95244
ID ABA9
KX ABA95244
A
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      29-AUG-2003
07-AUG-2003
10-JUN-2002
                    The invention relates to an isolated and purified yeast phenylalanine ammonia lyase (PAL) polypeptide. The PAL encoding polynucleotide or a host cell comprising the polynucleotide is useful for the production of I-PAL, by adding the polynucleotide or the host cell to a composition comprising trans-cinnamic acid, or trans-cinnamate and ammonia; and for improving the production of PAL, its analog or another optically active unnatural amino acid having PAL-like structure. The PAL polynucleotides are useful for treating a mammal having a disease, disorder or condition selected from phenylketonuria, cancer, human immunodeficiency virus infection and human cytomegalovirus infection. The present sequence represents a consensus polynucleotide sequence of the Rhodotorula PAL. (Updated on 07-AUG-2003 to correct OS field.) (Updated on 29-AUG-2003 to
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Rhodotorula mucilaginosa.
Rhodotorula mucilaginosa.
Rhodosporidium toruloides
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                PAL; yeast; phenylalanine ammonia lyase; cinnamic acid; cinnamate; cytostatic; anti-HIV; virucide; nootropic; dermatological; gene therapy;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Phenylalanine ammonia lyase polypeptide and polynucleotide useful treating mammal having disease or disorder from phenylketonuria, chuman immunodeficiency virus infection and human cytomegalovirus
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     consensus; ds.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          ABA95244 standard;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        24-JUL-2000; 2000US-00624693
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             24-JUL-2001; 2001WO-US023270
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            WO200208402-A2
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                misc_feature
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Rhodotorula
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     ABA95244;
                                                                                                                                                                                                                                                                                                                                                                                         Claim 5; Fig 2; 135pp; English
                                                                                                                                                                                                                                                                                                                                                                                                                                                   infection.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             P-PSDB;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       WPI; 2002-268973/31.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Yoshida
  standardise OS field)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     2137
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    2161
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                2101
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         2041
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               RK,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    PCBU
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                ABB07694.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    TA 2162
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        TA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CGCATCTACGAGGCCATCAAGDVCGGCHGCATCAACCACGTCCTCGTCAAGATGCTCGCD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CGCATCTACGAGGCCATCAAGGACGGCCGCATCAACCACGTCCTCGTCAAGATGCTCGCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GCCCGCCGCGGCGACGTCTTCCTCGGCAAGCAGGAGGTGACGATCGGCACCAACGTCTCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     PAL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        2198
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      (revised)
(revised)
(first entry)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Kootstra
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    SERVICES
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  toruloides.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     consensus
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Location/Qualifiers
1. .2475
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           /*tag= a
/note= "n= A or
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        ote= "n= A or C
that position"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             DNA; 2475
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               AB;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      INC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     polynucleotide sequence
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             ВÞ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              or
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Q
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ŧ,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    ij
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    indicates
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    ö
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    consensus
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 cancer,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 for
                                                                                                                                                                                                                                                                                        of L
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         2160
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          2196
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               2100
```

```
SS X
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              뮹
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      g
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              g
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      뮍
                                          Ś
                                                                                                                                   B
                                                                                                                                                                                                     8
                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                                                                             8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Query Match
Best Local Similarity
Matches 1878; Conserv
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Sequence 2475 BP; 350 A; 869 C;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           601
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     631
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              541
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   571
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             481
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 511
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           421
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                451
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         391
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        331
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      272
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                215
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              155
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          811
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   751
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  661
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           691
                                                   991
                                                                                                                                             901
                                                                                                                                                                                                                             931
                                                                                                                                                                                                                                                                                                                       841
                                                                                                                                                                                                                                                                                                                                                                                                                871
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     781
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               721
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             97
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      37
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      ب
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           GCCTCGATGGCCACGCGCGCACCAGTCGCAGCTCGAGATCGTGCAGGAGCTCCTCAGCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   CACGCCGNNCCGNCNNNGNCGNCNACGGGCGCCACGTCCACNCTCNGNCGGCCGNCGCNG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              cacececroceaeceaeceaececeaerroceaerroceaerroceaerroceaerroceaere--cee
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           ATGGCCCCTTCCTTGGACTCGCTCGCCACCACGCTCGCCAACGGCTTTACCAACGGCTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          TOGGCGCCGCCAAGGGGGCGCAGGGTCCGCGTC-CAGAACGACGACGACGAGATCCGCGCA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           ACCCCACCAC---GACGTCGTCGAGCTCAGCGTACAGCCTCACCGTGACGTTG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      ATGGCCCCCTCCNTCGACTCGATCGCGACCTCGNTCGCCAACGGCNTCNCNAACGGNTNG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   сттелестттеслевлення под применения применен
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             ĠĠĊĠĀĊĊŤĊŢĊĊĊĊŊĊŤĊŢĊŊŢĀĊĀŤĊĠĊĊĠĊĊĠŢĊĀĊĊĠĠŤĊĀĊĊĊĠĠĀĊŊŊĊĀĀĠ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          greaacregereacnegedeactegengreegenerecederegreeregaggedereace
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  gencececectros ada acroectro cectros as grades de cececa de acestros como esta de cececa de como esta de como
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   GACCCCGCCTCGAGAACACGCTTCCCCTCGAGGTCGTCCGCGCGCCATGGTCATCCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GCGCTCATCGAGCACCAGCTCTGCGGCGTGACGCCGACGTCCGYCTCGTCCTTCAGCGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         ACGACTGGTTTCGGCGGCCGGCCGACACCCGGACTGAGGATGCNATCTCGCTCCAGAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    ACCACGGGTTTCGGTGGCTCGGCCGACACGACGACTGAGGATGCAGTCAGCCTCCAGAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        AAGATCGACAANAGNGTCGAGTTCCTCCGNNCNCAGCTCNACAACAGNGTCTACGGNGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CGCGTCGACAAGAGCGTCGACTTCCTCAAGGCCCAGCTTCAGAACTCCGGTCTACGGAGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 TCGGCGCCGCNCGCAAGGGCCCGCNCNGTCCGCGTCNCAGACAGNCGACGAGATCCGCGCA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      ACCCCACCGNNACGNACGNNNTCGAACTCGACGGGTACACCCTCACCCTCGGNGACGTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GETEGETECTÉCEGACEACCAGNNGACGEAGETEGACATEGINGAGNAGATECTEGEEG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               GGCGACCTCAGCCCCGTCTCGTACATCGCCGGCCCATCACCGGTCACCCCGACGTCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                AACTTCCTCAACCACGCATCACCCCATCGTCCCCCTCCGCGGCACCATCTCGGCGTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    ARCTTCTTGAACCACCGCATCACGCCCATCGTCCCCCTCCGCGGCTCCATCTCGGCGTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           GENETECTEGAGEACEAGETETGEGGTGTNCTCCENAEGTEGNTEGANTECTTENGECTE
CCGTTCATCCACGACGTCTGCCGCCCCGCACCCCGGCCAGGTCGAGGTCGCGCGCAACATC
                                                                                                                                                                                                                                                                                                                       eccerercesceres are eccerer en estada de caracteres en estada est
                                                                                                                                                                                                                                                                                                                                                                      TTTGGTCTCGAGGCAGTCGTCCTCGGCCCGAAGGAGGGTCTCGGTCTGGTCAACGGAACG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               GTNCACGTNNTNCACGAGGGCANNGAGAAGATCATGTNCGCCCGCGAGGCGATCGCGCTC
                                                                                                                                        reseasseereacesereinaeseresasseerarsseeresseereseriesinese
                                                                                                                                                                                                 TCGCAGGCCTTGACGGCTCTCACGGTGGAGGCCATGGTCGGCCAGCAGGGCTCGTTCGCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     TINGGICTCGAGCCCGTCGTCCTCGGCCCGAAGGAGGGTCTCGGTCTCGTCAACGGCACG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          67.3%;
78.0%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Score 1629; DB 6;
Pred. No. 2.9e-249;
1; Mismatches 504;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   568 G; 341 T;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              504;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       0
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ₽.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            347 Other;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       2475;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              25;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 120
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       180
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            214
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      154
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    330
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   271
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            450
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      390
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     750
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        600
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 630
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    570
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              510
                                                                                                                                                                                                                                                990
                                                                                                                                                                                                                                                                                                                                                                                                                         930
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   840
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        870
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             780
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      810
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              660
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   690
                                                                                                                                                      960
                                                                                                                                                                                                                                                                                                                                         900
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              8
```

```
2054
                                                                        1981
                                                                                                                                               1921
                                                                                                                                                                                                                      1861
                                                                                                            1994
                                                                                                                                                                                 1934
                                                                                                                                                                                                                                                        1876
                                                                                                                                                                                                                                                                                                                             1816
                                                                                                                                                                                                                                                                                                                                                                 1741
                                                                                                                                                                                                                                                                                                                                                                                                    1756
                                                                                                                                                                                                                                                                                                                                                                                                                                      1681
                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1708
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1648
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1561
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1588
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1501
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1528
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1441
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1621
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1468
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1381
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1408
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1321
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1348
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1261
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1288
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1201
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1228
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1141
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1171
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1081
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1111
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1021
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1051
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   961
                                                                                           TGCGCGAGGAGCTCGGCGTGCAGGCGCCGCCGCGGCGACGTGTTTGTCGGCGTGCAGCAGCAGC
                                                                                                                                                                      CGGCCGAGAAGGCCATCTCGCTCACGCGCGAGGTGCGCAACCGCTTCTGGCAGACGCCGT
                                                                                                                                                                                                                  NNGTCCTCGCCNNNNGCCANNAGGTCTCGCTCGCNGCCGTCAACGCCTGGAAGGTCGCCT
                                                                                                                                                                                                                                                                                                          CTCGAGCCGCGCTGGCACGACGCCTTCTCGTACGCGACCGGCACCGTCGTCGAGCTCCTC
TCCGCGAGGAGCTCGGCGTCAAGGCCCGCCGCGGCGACGTCTTCCTCGGCAAGCAGGAGG
                                                                    CGTCGTCGCCCCGCGCTCNCGTACCTCTCGCCGCGCACGCGCGCCTCCTGTACTCGTTCG
                                                                                                                                           CCGCCGAGAAGGCCATCTCGCTCACGCGCNANGTCCGCGACNCCTTCTGGNCGGCNCCGT
                                                                                                                                                                                                                                                    TCGTCCTCGCCCTCTGCCA--ACGTCACCCTTACTGCCGTCAACGCGTGGAAGGTTGCCT
                                                                                                                                                                                                                                                                                                                                                                                          CTTGCGCTCGAGGTCAAGAAGGCGTCCAACAAGGGTCTCGAGCAGGACGACGACGACGTACGAC
                                                                                                                                                                                                                                                                                                                                                                                                                                  CAGGCCGTCGACCTCCGCGCGATGGAGCTCGACCTTCAAGAAGCAGTTCGACCCGCTTCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           GCCGCNGCNTACACTTCGGAGCTCGGNCACCTTGCCAACCCGGTNACGACCCACGTC
                                                                                                                                                                                                                                                                                       CTCGAGCCGCGCTGGCACGACGCCTTCTCGTTCGCGACCGGCACCGTCGTCGAGNNNNNN
                                                                                                                                                                                                                                                                                                                                                             CTCGNGGACAAGGTCAACAAGNCGCTCNACAAGCGNCTCGAGCAGCAACCCAACTCGTACGAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                      CCGACTCTCCTCCAGCAGCACCTCGGCACTGGCCTCGACGTC---
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CAGGCCGTCGACCTCCGCGCGATGGAGTTCGAGTTCAAGAAGCAGTTCGACCCGNTNNTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     ACTGCCGAGGCCAACGACGTCCTTTCTCTCCTTCTCGCCTCGCACCTGTACTGCACGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               ACNGCCGAGGCCAACGACGTCCTTCTCTCTCCTCCTCGCCACCCCACCTCTACTGCGTNCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CAGCCGGCNGAGATGGGCAACCAGGCCGTCAACTCGCTCGCNCTCATCTCGGCNCGCCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CACATCGCTGCTTACGCTTCGGAGCTCGGCCACCTTGCCAACCCGGTCACTACCTTCGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CONTCCTGCCTGCCGAGGACCCNTCGCTCTCCTATCACTGCAAGGGCCTCGACATT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CCTTCGTGCCTGCCGACGACCCGTCGCTCAACTATCACCGCCAAGGGCTTGGACATT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            GGCAAGCTCAACTTCACGCAGTGCACCGAGTTGCTCAACGCTGCCATGAACCGCGGGCTG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              TTCCAGGCGTCGGCTGTCTCGATTTCGATGGAGAGACCAGGCTCGCACTCGCCCTCATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      TCGACGACCGACAACCCGCTCATCGACGTCGAGAACAAGANGACCCACCACGGCGGCAAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ACGACGACCGACAACCCGCTCCTCGACGTCGAGAACAAGCAGACCGCGCGCACGGCGGCAAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GGCCCGCTCGTCAGCGACATGATTCACGCCCACGCNGTCCTCTCGCTCGAGGCCGGNCAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GACGACGAGGGCATTCTCCGCCAGGACCGCTACCCGCTCCGCACGTCGCCTCAGTGGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       GACGACGAGGGCATICTTCGCCAGGACCGCTACCCGCTCCGCACGTCCGCTCAGTTCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 CGCACGCTCCTTTCCGGCTCGTCGTTTGCCGTTGAGCACGAGGAGGAGGAGGTCAAGGTCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GGCAAGCTCAACTTCACGCAGCTCACCGAGATGCTCAACGCCGGCATGAACCGCGGCCTN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             CGCACGCTCCTCGAGGCAGCNNGTTTGCCGTCCACCACGAGGAGGAGGTCAAGGTCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               CONTTCCTCCACGACGTCACGCGCCCTCACCCGACCCAGATCGAGGTCGCGCGCAACATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                      ----AACGCA
                                2113
                                                                    2040
                                                                                                         2053
                                                                                                                                           1980
                                                                                                                                                                             1993
                                                                                                                                                                                                                  1920
                                                                                                                                                                                                                                                    1933
                                                                                                                                                                                                                                                                                                                         1875
                                                                                                                                                                                                                                                                                                                                                             1800
                                                                                                                                                                                                                                                                                                                                                                                                1815
                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1755
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1680
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1707
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1620
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1647
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1587
                                                                                                                                                                                                                                                                                         1860
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1560
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1500
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1527
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1440
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1467
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1320
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1347
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1260
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1287
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1227
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1140
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1200
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1170
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1080
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1110
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1020
```

성 음 성

DЬ Ş Дb Ś В Š DЪ Ş В Ş Ъ Š 8

S

밁

2100

The present invention relates to yeast (e.g. Rhodotorula) phenylalanine ammonia lyase (PAL; EC 4.3.1.5) proteins and polynucleotides encoding such proteins. PAL sequences are useful for producing L-phenylalanine. They are useful for treating mammals having diseases, disorders or conditions that would benefit from treatment with PAL proteins such as phenylketonuria, cancer, human immunodeficiency virus infection (HIV) on human cytomegalovirus (hCMV) infection. Sequences of the invention are

o H

Claim

<u>ن</u>

Page 45-46;

74pp; English.

cancer,

\$ Ъ Ś В Ş 망 Ş 밁 5 뫄 Ş Дb δ В Ş 맑 5 4

망

```
5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     멂
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          S
                                                                                                                                                                                                                                                                                                                                                                                                          Novel isolated and purified Rhodotorula phenylalanine ammonia lyase polypeptide, useful for treating a mammal having phenylketonuria, continuan immunodeficiency virus or human cytomegalovirus infection.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Rhodotorula graminis.
Rhodotorula mucilaginosa.
Rhodosporidium toruloides
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Yoshida
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            24-JUL-2000;
24-JUL-2001;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        01-AUG-2002
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             24-AUG-2001;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Yeast; phenylalanine ammonia lyase; PAL; EC 4.3.1.5; phenylketonuria; cancer; human immunodeficiency virus infection; HIV; gene therapy; hCMV; human cytomegalovirus infection; cytostatic; virucide; ds.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   (PCBU-)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      US2002102712-A1
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Phenylalanine ammonia lyase consensus
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  07-AUG-2003
27-DEC-2002
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            AAD45816;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              AAD45816
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     2401
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               2412
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 2341
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   2353
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      2281
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               2293
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             2161
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  2101
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            2114
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       2002-690616/74
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               2233
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  2221
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                RK,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   PCBU
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          standard;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 NNNANAAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   AAAAAAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 NGTININCANINACNCNTININININANNCNGGNANNGANTINIANGNITINCGNGNINCNINININI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           GGTCGTCA-GTACACGTGTATAGAGCCTGGAATGGATTGCAAGTCTTCGAGTTCAAAAAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             THIMMICHT NINCTONCT CHCMININAN CHNGT CHNTHIMMINCTIMINGINITIMINININININICH THE THREE CHARLES AND A CH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             NNNCCNNNNNNNCTNTTNGNNNTCGNNTCNTGNCNNNNNCGGANNTNNCNNCNNNNNNN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         TGACGATCGGCACCAACGTCTCCCGCATCTACGAGGCCATCAAGNNCGGCNGCATCAACC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          AGACGATCGGGGATCTACGAGGCCATCAAGGACGGCCGCATCAACC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       rencecernaciones de la constanta de la constant
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ACCCCAAGACCAGCTTTTCGACGTCGTGTCGTGCCAAGAACGGACTTTCCTCCATACACA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         ACGTCCTCGTCAAGATGCTCGCNTAGNNICNCNNNCNANNCTCGCNTNNNNNCCNNNCNC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ACGTCCTCGTCAAGATGCTCGCGTA-AGGCCCGAGCAAGCCTCGCCTAGACGCCCGCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Kootstra
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          SERVICES INC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            2000US-00624693
2001WO-US023270
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      2001US-00939408
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              (revised)
(first entry)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 2408
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          DNA;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                AΒ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          2475
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          дB
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                DNA.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               2173
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             2340
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           2352
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         2280
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           2292
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       2232
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         2160
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         2220
```

also used in gene therapy. The present sequence is PAL consensus DNA.  (Typdated on 07-AuG-2003 to correct Of field.)  Sequence 2475 BP; 350 A; 869 C; 568 G; 341 T; 0 U; 347 Other;  Query Match  17 Sequence 2475 BP; 350 A; 869 C; 568 G; 341 T; 0 U; 347 Other;  Parches 178; Conservative 1; 1 Mismatches 504; Index 22; daps  27 A PROGRESSIAL P
B; Qy 991 1051 1051 1051 1051 1051 1051 1051
CCHTCHICANCIACIANCETTOCCCCCCACACACCCCCCCCACACACCCCCCCCCCC

```
맑
                                                                                                                                                                                                                                                                                                                                                                        Ś
                                                                                                                                                                                                                                                                                                                                                                                        망
                                                                                                                                                                                                                                                                                                                                                                                                  8
                                                                                                                                                                                                                                                                                                                                                                                                                  맔
                                                                                                                                                                                                                                                                                                                                                                                                                                 Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                B
                                                                                                                                                                                                                                                                                                                                                                                                                                                             8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                망
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           g
 27-JUL-2000;
               23-JAN-2001; 2001WO-US002099
                                             WO200210407
                                                                    mutation
                                                                                                                                                                                                                                  Para-hydroxycinnamic acid; PHCA; food packaging; electronic corphenylalanine ammonia lyase; PAL; glucose; tyrosine ammonia lyacytochrome p-450; cytochrome p-450 reductase; liquid crystal pc LCP; telecommunication; medical device; aerospace application;
                                                                                                 mutation
                                                                                                                mutation
                                                                                                                                             mutation
                                                                                                                                                                                                        Rhodotorula
Synthetic.
                                                                                                                                                                                                                                                                         R. glutinis
                                                                                                                                                                                                                              biocatalyst;
                                                                                                                                                                                                                                                                                         01-JUL-2002
                                                                                                                                                                                                                                                                                                                      AAD33097 standard;
                                                                                                                                                                                                                                                                                                                                                                           2412
                                                                                                                                                                                                                                                                                                                                                                                                        2353
                                                                                                                                                                                                                                                                                                                                                                                                                      2281
                                                                                                                                                                                                                                                                                                                                                           2401
                                                                                                                                                                                                                                                                                                                                                                                         2341
                                                                                                                                                                                                                                                                                                                                                                                                                                     2293
                                                                                                                                                                                                                                                                                                                                                                                                                                                     2221
                                                                                                                                                                                                                                                                                                                                                                                                                                                                   2233
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  2161
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 2174
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                2101
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            2041
                                                                                                                                                                                                                                                                                                                                                           NNNANAAA 2408
                                                                                                                                                                                                                                                                                                                                                                           AAAAAAA
                                                                                                                                                                                                                                                                                                                                                                                        NGTNNNCANNNACNCNTNNNNNNANNCNGGNANNGANTNNANGNNTNCGNGNNCNNNNNN 2400
                                                                                                                                                                                                                                                                                                                                                                                                      GGTCGTCA-GTACACGTGTATAGAGCCTGGAATGGATTGCAAGTCTTCGAGTTCAAAAAA
                                                                                                                                                                                                                                                                                                                                                                                                                    TINNINCUTINICTONICTONICNNINANCINGTONITNNINNINCTINNIGHITNNINNINNINCINNIC
                                                                                                                                                                                                                                                                                                                                                                                                                                                  NNNCCHNNNNNNCTNTTNGMNNTCGNNTCNTGNCNNNNNCGGANNTNNCNNCNNNNNNN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ACCCCAAGACCAGCTTTTCGACGTCGTGTCGTGCCAAGAACGGACTTTCCTCCATACACA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          ACGTCCTCGTCAAGATGCTCGCGTA-AGGCCCGAGCAAGCCTCGCCTAGACGCCGCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              TGACGATCGGCACCAACGTCTCCCGCATCTACGAGGCCATCAAGNNCGGCNGCATCAACC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           AGACGATCGGGAGCAACGTCTCGGGGCATCTACGAGGCCATCAAGGACGGCCGCATCAACC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Tercecctracterceccercarcacercreaerretracerarecececererere
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ACGTCCTCGTCAAGATGCTCGCNTAGNNNCNCNNNCNANNCTCGCNTNNNNNCCNNNCNC
 2000US-00627216
                                                                                                                                                                                                              glutinis.
                                                                                                                                                                                                                                                                         phenylalanine
                                                                                                                                                                                                                             mutant;
                                                                                                                                                                                                                                                                                        (first entry)
                                                                                        replace(
/*tag=
                                                           replace(1619,
/*tag= g
                                                                         replace(858,
/*tag= f
                                                                                                                      replace(592.
/*tag= c
                                                                                                              replace(645,
                                                                                                                                    replace(526,
/*tag=_b
                                                                                                                                                  /product= "Rhodotorula glutinis PAL mutant"
/transl_except= (pos:592. .594, aa:Asp)
/EC_number= "4.3.1.5"
                                                                                                                                                                                        ocation/Qualifiers
                                                                                                                                                                                                                                                                                                                                                                           2419
                                                                                                                                                                                                                                                                                                                      DNA;
                                                                                                                                                                                                                             variant; gene; ds.
                                                                                               (792,
                                                                                                                                                                                                                                                                                                                      2151
                                                                                                                                                                                                                                                                         ammonia lyase
                                                                                 ij
                                                                                                ď
                                                                                                              9
                                                                                                                                             ij
                                                                                                                              . 593,
                                                                                                                                                                                                                                                                                                                      ΒP
                                                                    7
                                                                                                                              <u>පු</u>
                                                                                                                                                                                                                                                                        (PAL) mutant
                                                                                                                                                                                                                                                                        DNA,
                                                                                                                                                                                                                                                                         RM120-2.
                                                                                                                                                                                                                                                 connector;
lyase; TAL
                                                                                                                                                                                                                                    enzyme;
                                                                                                                                                                                                                                                  TAL;
                                                                                                                                                                                                                                                                                                                                                                                                     2411
                                                                                                                                                                                                                                                                                                                                                                                                                                   2352
                                                                                                                                                                                                                                                                                                                                                                                                                                                  2280
                                                                                                                                                                                                                                                                                                                                                                                                                                                                 2292
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 2220
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               2232
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              2160
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            2173
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           2100
밁
         Ş
                            밁
                                        8
                                                         밁
                                                                       Ş
                                                                                      B
                                                                                                  Ş
                                                                                                                     밁
                                                                                                                                                               Ş
                                                                                                                                                                               B
                                                                                                                                  8
                                                                                                                                                  밁
                                                                                                                                                                                             Ş
                                                                                                                                                                                                            片
                                                                                                                                                                                                                                                                        Query Match
Best Local Simi
Matches 1566;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                hydroxylase
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Gatenby AA,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          (DUPO)
             519
                                           459
                                                         345
465
                            405
                                                                         399
                                                                                       285
                                                                                                     339
                                                                                                                    225
                                                                                                                                   279
                                                                                                                                                  165
                                                                                                                                                               219
                                                                                                                                                                               105
                                                                                                                                                                                               159
                                                                                                                                                                                                            45
                                                                                                                                                                                                                            99
                                                                                                                                                                                                                                                 Similarity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          밍
```

```
Novel nucleic acid encoding truncated mutant tyrosine ammonia lyase polypeptide, or mutant TAL polypeptide, useful for producing parahydroxycinnamic acid in recombinant host cell lacking cinnamate
                                                                        WFI; 2002-280635/32
P-PSDB; AAE20665.
                                                                                                                                                     PONT DE NEMOURS
                                                                                                                       Sariaslani
                                                                                                                       FS,
                                                                                                                                                       Ŗ,
                                                                                                                      Tang
                                                                                                                                                       8
                                                                                                                                                       Ħ
                                                                                                                      ×
                                                                                                                                                       Н
                                                                                                                      <u>۾</u>
                                                                                                                       ¥,
                                                                                                                       Vannelli
                                                                                                                       Н
```

(TAL)

Example 22; Page; 139pp; English

The invention relates to methods for biological production of paracic (phydroxycinnamic acid (PHCA). The invention relates to developing of a new CC biocatalyst for conversion of glucose to PHCA by incorporation of the CC wild type phenylalanine ammonia lyase (PAL; EC 4.3.1.5) from the yeast CR hodotorula glutinis into Escherichia coli underlying the ability of the wildtype PAL to convert tyrosine to PHCA. The invention is also directed to developing a new biocatalyst for conversion of glucose to PHCA by CC incorporation of the wildtype PAL which possesses enhanced tyrosine ammonia lyase (TAL) activity from the yeast Rhodotorula glutinis plus the plant cytochrome p-450 and the cytochrome p-450 reductase into E. coli. CN Mucleic acid encoding mutant TAL enzyme is useful for producing PHCA by CC recombinant techniques. The recombinantly produced PHCA may be used as a componer for production of liquid crystal polymers (LCP). LCP may be used in electronic connectors and telecommunication and aerospace applications. LCP resistance to sterilising radiation has also enabled these materials to be used in medical devices as well as chemical, and food packaging applications. The present sequence is Rhodotorula glutinis CP AL mutant DNA. Note: This sequence is not shown in the specification, the weever it is constructed based on the PAL DNA shown as SEQ.ID.NO:7

Sequence 2151 BP; 383 A; 832 C; 563 G; 373 T; 0 U; 0 Other;

49.5%;

9

Length

2151;

GACCGACTCGACGCTCGAACTCGACGGCTACTCGCTCAACCTCGGAGACGTCGTCTCGGC ATTTGGCGGATCCGCAGACACCCGCACCGAGGACGCCATCTCGCTCCAGAAGGCTCTCCT ceaecaecaecrereceses aceceaecereces en control de la contro TTTCGGTGGCTCGGCCGACACGAGGACTGAGGATGCAGTCAGCCTCCAGAAGGCGCTCAT CAAATCGGTCGAGTTCTTGCGCTCGCAACTCTCCATGAGCGTCTACGGCGTCACGACTGG CAAGAGCGTCGACTTCCTCAAGGCCCAGCTTCAGAACTCGGTCTACGGAGTCACCACGGG CCCGAGGAAGGGCAGGCCTGTCCGCGTCAAGGACAGCGACGAGATCCGCTCAAAGATTGA CGCCCGCAAGGGCGCAGGGTCCGCGTCCAGAACGACGACGAGATCCGCGCACGCGTCGA cacceaças concercios de la concentración de la concentraci GCACCTGCCCACAACCCCAGGTCACGCAGGTCGACATCGTCGAGAAGATGCTCGCCGCGCGC CGATGGCCACGCGCACCAGTCGCAGCTCGAGATCGTGCAGGAGCTCCTCAGCGACCC CGTCGCATCCGCAAAGCAGGCTGTCAATGGCGCCTCGACCAACCTCGCAGTCGCAGGCTC ceccecrocaycayerceecrecesecccocycriceecrececcecacecccecccc Conservative ĊŦĊŦĠĊĠĠŦĠŦŦĊŦĊĊĊŦŦĊĠŦĊĠŦŦĊĠĄĊŦĊĠŦŦĊĊĠĊĊŦĊĠĠĊĊĠĊĠĠ ۲. Score 1198.2; DB 6 Pred. No. 4.8e-181; 1; Mismatches 524; 524; Indels 24; Gaps 158 578 464 404 458 344 398 104 284 338 224 278 164 218 w

```
1185
                                                                                                                                                                                                                                                                                                                                                                            1125
                                                                                                                                                                                                                                                                                                                                                                                                         1179
                                                                                                                                                                                                                                                                                                                                                                                                                                      1065
                                                                                                                                                                                                                                                                                                                                                                                                                                                                1119
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1005
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1059
                                                                                      1425
                                                                                                                  1476
                                                                                                                                             1365
                                                                                                                                                                          1416
                                                                                                                                                                                                       1305
                                                                                                                                                                                                                                                               1245
                                                                                                                                                                                                                                                                                          1296
                                                                                                                                                                                                                                                                                                                                                   1236
 1596
                              1485
                                                         1536
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       945
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  999
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               885
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          939
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       825
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   879
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           819
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              645
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          699
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       585
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               765
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        705
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  759
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          GGGCATTCTTCGCCAGGACCGCTACCCGCTCCGCACGTCGCCTCAGTTCCTCGGCCCGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CCTTTCCGGCTCGTCGTTTGCCGTTGAGCACGAGGAGGAGGTCAAGGTCAAGGTCAAGGACGACGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ccacgacgrerecceccaceccaccaccacgrereges
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               GCTCACGGCCATGACGGTCGAAGCGATGGTCGGCCACGCCGGCTCGTTCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      CGAGGCAGTCGTCGGCCCGAAGGAAGGATCTCGGTCTGGTCAACGGAACGGCCGTCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               TTTGCACGAGGAACCGAGAAGATCATGTTTGCGCGCGAGGCCATCTCGCTCTTTGGTCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CTCTCCTCTCCTACATTGCAGCGGCCATCAGCGGTCACCCGGACAGCAAGGTGCACGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CAGCCCGCTCTCGTACATCGCCGGCGCCATCACCCGGTCACCCCGACGTCAAGGTTCACGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CAACCACCACCACCACCATCGTCCCCCTCCGCGCACCATCTCTGCGTCGGGCGACCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GAACCACCGCATCACGCCCATCGTCCCCCTCCGCGGCTCCATCTCGGCGTCGGGCGACCT
                                                                                                                                                                                                                                                                                 GTCGGCTGTCTCGATTTCGATGGAGAAGAACAACCTCGCCTCATCGCCCTCATCGGCAAGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 CTTGACGGCTCTCACGGTGGAGGCCAIGGTCGGCCAGCAGGGCTCGTTCGTTCGCGCCGTTCAT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         AGCATCGATGGCCACCCTCGCTCTGCACGACGCACACATGCTCTCGCTCCTCGCAGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             CGCCTCGATGGCGACCCTCAGTCTGCACGACTCGCACATGCTCTCGCTCCTCTCGCAGGC 938
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               CGAGCCCGTCGTCCCCGCCCGAAGGAGGGTCTCGGTCTCGTCAACGGCACCGCCGTCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CGTCCACGAGGGCAAGGAGGATCCTGTACGCCCGGGAGGCGATGGCGCTCTTCAACCT
                            chaetreacecaecreacedaearecreaaceceecareaaceceecececerecre
                                                                                                                                                                                                                         reccecrereeccaacaccareeadadadacreeccreeecreecceceacareedadecr
                                                                                                                                                                                                                                                                                                                      CGACAACCCTCTCATCGACGTCGAGAACAAGACTTCGCACCACGGCGGCAATTTCCAGGC
                                                                                                                                                                                                                                                                                                                                      CGTGGAGGACATGATGCACGCCTACTCGACTCTCTCGCCTCGAGAACAACA---CGACGAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             TCACGACGTCACGCGCCCTCACCCGACGCAGATCGAAGTCGCGGGAAACATCCGCAAGCT
GGCCAACGACGTCCTTTCTCTCCTTCTCGCCTCGCACCTGTACTGCACGCTCCAGGCCGT
                                                                                     GGCGTACACCTCGGAGTTGGGAACACCTCGCCAACCCTGTGACGACGCATGTCCAGCCGGC
                                                                                                       CCTCGCTGCCGAGGACCCCGTCGCTCAACTATCACGGCAAGGGCTTGGACATTCACATCGC
                                                                                                                                                                                                                                                                                                                                                                              ceredegecegaagaeeerereeraeeaereeaereeaaeaeeereeaaeareeeree
                                                                                                                     1535
                                                                                                                                                                             1475
                                                                                                                                                                                                                                                                  1304
                                                                                                                                                                                                                                                                                             1355
                                                                                                                                                                                                                                                                                                                                                                                                            1235
                                                                                                                                                                                                                                                                                                                                                                                                                                         1124
                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1178
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1064
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1004
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1058
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     818
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             758
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          644
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     698
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 584
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            638
                                 1544
                                                            1595
                                                                                         1484
                                                                                                                                                 1424
                                                                                                                                                                                                        1364
                                                                                                                                                                                                                                     1415
                                                                                                                                                                                                                                                                                                                         1244
                                                                                                                                                                                                                                                                                                                                                                                 1184
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  944
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               998
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          884
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   824
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               878
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         764
      1655
```

ž

밁

ž

Š

유 첫 유

¥

상 유

밁

1545

GTCCAACGACGTCCTTT

CTCTCCTCGCCACCCACCTCTACTGCGTTCTCCAAGCCAT

```
멍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       뫄
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           뫄
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  멍
                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                 8
                                                                                                                                                                                                                                                                                                                                                                                                                         A 43
                                                                                                                                                                                                                                                                                                                                                                                                                                                                  よ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                   para-hydroxycinnamic acid; PHCA; food packaging; electronic connector; phenylalanine ammonia lyase; PAL; glucose; tyrosine ammonia lyase; TAL; cytcochrome p-450; cytcochrome p-450; cytcochrome p-450; reductase; liquid crystal polymer; LCP; telecommunication; medical device; aerospace application; enzyme;
                                                                                                                                                                                                                                                        Rhodotorula glutinis phenylalanine ammonia lyase (PAL)
                                                                                                                                                                                                                                                                                 01-JUL-2002
                                                                                                                                                                                                                                                                                                                             AAD33076
           27-JUL-2000; 2000US-00627216
                                 23-JAN-2001; 2001WO-US002099
                                                                                                                                                        Synthetic.
                                                                                                                                                                  Rhodotorula
                                                                                                                                                                                       biocatalyst; gene; mutant; variant; ds.
                                                                             WO200210407-A1
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1725
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1896
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1944
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1785
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1764
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1956
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1845
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1884
                                                                                                                                                                                                                                                                                                                                                                                                                              2076
                                                                                                                                                                                                                                                                                                                                                                                                                                                                           2016
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            2004
                                                                                                                                                                                                                                                                                                                                                                                                        2184
                                                                                                                                                                                                                                                                                                                                                                                                                                                     2124
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CGAGGTCAAGAAGGGGCTCAACAAGCGTCTCGAGCAGACGACGACGTACGACCTCGAGCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               CATCGACCAGCACTTTGGCTCCGCCATGACCGGCTCGAACCTGCGCGACGAGCTCGTCGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           cdactrrecececedaecedaetrecaetrecaedaetrecaedaecearcecereceer
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      CGACCTCCGCGCGATGGAGCTCGACCTTCAAGAAGCAGTTCGACCCGCTTCTCCCGACTCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GCTCGGCGTGCAGGCGCGCCGCCGACGTGTTTGTCGGCGTGCAGCAGGAGACGATCGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 GGCCATCTCGCTCACGCGCGAGGTGCGCAACCGCTTCTGGCAGACGCCGTCTTCGCAGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     gaadgrgaacaagacgcrcccaagcgccrcgagcagaccaacrcgracgaccrccrcc
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ccrccaccaccaccrcecacrescrescaccrca
                                                                                                                                                                                                                                                                                                                                                                                                 CAAGATGCTCGCGTA
                                                                                                                                                                                                                                                                                                                                                                                                                                            GAGCAACGTCTCGCGCATCTACGAGGCCATCAAGGACGGCCGCATCAACCACGTCCTCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                           GCCCGCGCTCTCGTACCTCTCGCCGCGCACTCAGATCCTCTACGCCTTCGTCCGCGAGGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GGCCATCTCGCTCACCCGCCAAGTCCGCGAGACCTTCTGGTCCGCCGCGTCGACCTCGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               GTC-----
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            GCCTCTGCCAACGTCACCCTTACTGCCGTCGAACGCTTGGAAGGTTGCCTCGGCCGAGAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        GCGCTGGCACGACGCCTTCTCCTTCGCCGCCGCCACCGTCGTCGAAGGTCCTCTCGTCGAC
                                                                                                                                                                                                                                                                                                                             standard; DNA;
                                                                                                                                                                                                                                                                                                                                                                                    CAAGATGCTCGCTTA
                                                                                                                                                                                                                                                                                                                                                                                                                               CTCGAACGTCTCCAAGATCTACGAGGCCATCAAGTCGGGCAGGATCAACAACGTCCTCCT
                                                                                                                                                                  glutinis.
                                                                                                                                                                                                                                                                                 (first
                                                                                                                       Location/Qualifiers
1. .2151
                                                                                                              /*tag=
                                                                                                   /product=
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              -- generedecedecerchaedecradadeiredecedecedecedece
                                                                                                                                                                                                                                                                                                                              2151
                                                                                                                                                                                                                                                                                                                                                                                     2150
                                                                                                                                                                                                                                                                                                                                                                                                         2198
                                                                                                     "Rhodotorula
                                                                                                                                                                                                                                                                                                                              ВР
                                                                                                    glutinis
                                                                                                     mutant
                                                                                                                                                                                                                                                              mutant
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        -ACCCACTTGCGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1955
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1895
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1844
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1883
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1784
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1664
                                                                                                                                                                                                                                                                                                                                                                                                                                                        2183
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   2123
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         2015
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            2003
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1943
                                                                                                                                                                                                                                                                                                                                                                                                                                                                               2075
```

```
S
                                                                                                                                                                          밁
                                                                                                                                                                                                             8
                                                                                                                                                                                                                                                                    멍
                                                                                                                                                                                                                                                                                                            Ş
                                                                                                                                                                                                                                                                                                                                                                                                    8
                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                   멍
                                                                                                                                                                                                                                                                                                                                                                                                                                                              Дb
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  The invention relates to methods for biological production of para-
CC hydroxycinnamic acid (PHCA). The invention relates to developing of a new
CC biocatalyst for conversion of glucose to PHCA by incorporation of the
CC wild type phenylalanine ammonia lyase (PAL; EC 4.3.1.5) from the yeast
CC Rhodotorula glutinis into Escherichia coli underlying the ability of the
CC wildtype PAL to convert tyrosine to PHCA. The invention is also directed
CC to developing a new biocatalyst for conversion of glucose to PHCA by
CC incorporation of the wildtype PAL which possesses enhanced tyrosine
CC ammonia lyase (TAL) activity from the yeast Rhodotorula glutinis plus the
CC plant cytochrome p-450 and the cytochrome p-450 reductase into E. coli.
CC Nucleic acid encoding mutant TAL enzyme is useful for producing PHCA by
CC recombinant techniques. The recombinantly produced PHCA may be used as a
CC monomer for production of liquid crystal polymers (LCP). LCP may be used
CC in electronic connectors and telecommunication and aerospace
CC applications. LCP resistance to sterilising radiation has also enabled
CC those materials to be used in medical devices as well as chemical, and
CC food packaging applications. The present sequence is Rhodotorula glutinis
CC DAL murant NAL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Matches 1565;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Query Match
Best Local Similarity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Novel nucleic acid encoding truncated mupolypeptide, or mutant TAL polypeptide, parahydroxycinnamic acid in recombinant
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Sequence
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Example 10; Page 95-98; 139pp; English
                                     579
                                                                                                                                                                               405
                                                                                  465
                                                                                                                                                                                                                          459
                                                                                                                                                                                                                                                                         345
                                                                                                                                                                                                                                                                                                                      399
                                                                                                                                                                                                                                                                                                                                                                      285
                                                                                                                                                                                                                                                                                                                                                                                                                 339
                                                                                                                                                                                                                                                                                                                                                                                                                                                                225
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             165
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       159
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    45
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   99
GCTCACGCGTGGCCACTCGGCCGTCCGTCGTCGTCGTCGTCGCGACTCACCAACTTCTT
                                                                                                                                                                                                                  ceaecaccaecroreceses a aceceses aceceses con contra 
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             2151
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        ÃĄ,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  D
                                                                             TCTCGAGAACTCGCTTCCCCTCGAGGTTGTTCGCGGCGCCATGACAATCCGCGTCAACAG
                                                                                                                                                                                                                                                                                                     TTTCGGTGGCTCGGCCGACACGAGGACTGAGGATGCAGTCAGCCTCCAGAAGGCGCTCAT
                                                                                                                                                                                                                                                                                                                                                                                                         CAAGAGCGTCGACTTCCTCAAGGCCCAGCTTCAGAACTCGGTCTACGGAGTCACCACGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        GACCGACTCGAACTCGAACTCGACGGCTACTCGCTCAACCTCGGAGACGTCGTCTCGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             CACCGACGACGTCGTCGAGCTCAGCGGGTACAGCCTCACCGTTCGTGACGTTGTCGGCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CGATGGCCACGCGCGCACCAGTCGCAGCTCGAGGATCGTGCAGGAGCTCCTCAGCGACCC
                                                                                                                                                                                                                                                                                                                                                                 CAAATCGGTCGAGTTCTTGCGCTCGCAACTCTCCATGAGCGTCTACGGCGTCACGACTGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                           CGCGAGGAAGGGCAGGCCTGTCCGCGTCAAGGACAGCGACGAGATCCGCTCAAAGATTGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        GCACCTGCCCACAACCCAGGTCACGCAGGTCGACATCGTCGAGAAGATGCTCGCCGCGCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               CGTCGCATCCGCAAAGCAGGCTGTCAATGGCGCCTCGACCAACCTCGCAGTCGCAGGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CGCCGCTCCGACCAAGTCGGCTGCGGGCCCCACTTCGGCTCTCCGCCGCCACGCCCCGGCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     PONT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              49.5%;
ilarity 74.0%;
Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Sariaslani
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             B₽;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  DΕ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        382 A;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  NEMOURS
                                                                                                                                                                          CTGCGGTGTTCTCCCTTCGTCGTTCGACTCGTTCCGCCTCGGCCGCGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     FS,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        830 C;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ŕ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Score 1196.6;
Pred. No. 8.6e
1; Mismatches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Tang
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           565
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  tri
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ×
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  H
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        <u>ი</u>
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             mutant tyrosine ammonia lyase e, useful for producing nt host cell lacking cinnamate
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           374
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   P.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  6; DB 6;
8.6e-181;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   WW.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   T; 0 U; 0 Other;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           2151
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         24;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               (TAL)
                              638
                                                                                                                        578
                                                                                                                                                                                                                     516
                                                                                                                                                                                                                                                                                                                                                                                                              398
                                                                                                                                                                       464
                                                                                                                                                                                                                                                                    404
                                                                                                                                                                                                                                                                                                                                                              344
                                                                                                                                                                                                                                                                                                                                                                                                                                                           284
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        224
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  164
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               218
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               104
                                     Ş
                                                                                               뮰
                                                                                                                                         Ś
                                                                                                                                                                               밁
                                                                                                                                                                                                                               Ş
                                                                                                                                                                                                                                                                                        В
                                                                                                                                                                                                                                                                                                                         Ş
                                                                                                                                                                                                                                                                                                                                                                                  В
                                                                                                                                                                                                                                                                                                                                                                                                                           8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                             В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      맑
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       뮰
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Ą
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            ₽.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                                                                                                                                                  1416
                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1305
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1245
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1179
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1125
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1119
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1005
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         945
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    999
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   885
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   939
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                825
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             879
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          819
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          705
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    645
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             765
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    759
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 699
  CGACTTGCGCGCGACCGAGTTCGAGTTCAAGAAGCAGTTCGGCCCAGCCATCGTCTCGCT
                                   CGACCTCCGCGCGATGGAGCTCGACTTCAAGAAGCAGTTCGACCCGCTTCTCCCGACTCT
                                                                                                                               GGCCAACGACGTCCTTTCTCTCTCTCGCCTCGCACCTGTACTGCACGCTCCAGGCCGT
                                                                                                                                                                                                                               GTCCAACGACGTCCTTCTCTCCTCCTCGCCACCCACCTCTACTGCGTTCTCCAAGCCAT
                                                                                                                                                                                                                                                                                   GGCGTACACCTCGGAGTTGGGACACCTCGCCAACCCTGTGACGACGCATGTCCAGCCGGC
                                                                                                                                                                                                                                                                                                                                                                                                              CCTCGCTGCCGAGGACCCGTCGCTCAACTATCACGGCAAGGGCTTGGACATTCACATCGC
                                                                                                                                                                                                                                                                                                                                   TECTTACECTTCEGAECTCEGCCACCTTECCAACCCGGTCACTACCTTCETCCAGCCCGC
                                                                                                                                                                                                                                                                                                                                                                                CCTCGCGGCCGAAGACCCCTCGCTCCCTACCACTGCAAGGGCCTCGACATCGCCGCTGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                             CAACTTCACGCAGCTCACCGAGATGCTCAACGCCGGCATGAACCGCGGCCTCCCCTCCTG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       TGCCGCTGTGGCCAACACCATGGAGAAGACTCGCCTCGGGCTCGCCAGATCGGCAAGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       GTCGGCTGTCTCGATTTCGATGGAGAAGACCAGGCTCGCACTCGCCCTCATCGGCAAGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CGACAACCCTCTCATCGACGTCGAGAACAAGACTTCGCACCACGGCGGCGATTTTCCAGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               CGACAACCCGCTCCTCGACGAGAACAAGCAGACCGCGCACGGCGGCAACTTCCAGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CGTGGAGGACATGATGCACGCCTACTCGACTCTCGCTCGAGGAACAACA---CGACGAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CCACGACGTCTGCCGCCCGCACCCCGGCCAGGTCGAGGTCGCGCGCAACATCCCGCACGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           GGGCATTCTCCGCCAGGACCGCTACCCCTTGCGCACGTCTCCTCAGTGGCTCGGCCCGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CCTCGAGGGAAGCCGCTTTGCTGTCCACCATGAGGAGGAGGAGGTCAAGGTCAAGGACGACGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CCTTTCCGGCTCGTCGTTGCCGTTGAGCACGAGGAGGAGGAGGTCAAGGTCAAGGACGACGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    TCACGACGTCACGCCCCTCACCCGACGCAGATCGAAGTCGCGGGAAACATCCGCAAGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 GCTCACGGCCATGACGGTCGAAGCGATGGTCGGCCACGCCTCGTTCCACCCCTTCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CTTGACGGCTCTCACGGTGGAGGCCATGGTCGGCCAGCAGGGCTCGTTCAT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           AGCATCGATGGCCACCCTCGCTCTGCACGCCACACATGCTCTCGCTCCTCGCAGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CGAGCCCGTCGTCCTCGGCCCGAAGGAGGGTCTCGGTCTCGTCAACGGCACCGCCGTCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CGAGGCAGTCGTCCTCGGCCCGAAGGAGGGTCTCGGTCTGGTCAACGGAACGGCCGTCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CGTCCACGAGGGCAAGGAGAAGATCCTGTACGCCCGCGAGGCGATGGCGCTCTTCAACCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        TTTGCACGAGGGAACCGAGAAGATCATGTTTGCGCGCGAGGCCATCTCGCTCTTTGGTCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               CAGCCCGCTCTCGTACATCGCCGGCGCCATCACCGGTCACCCCCGACGTCAAGGTTCACGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CAACCACGGCATCACCCCCATCGTCCCCCCCCGCGCACCATCTCTGCGTCGGGCGACCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 CTCTCCTCTCCTACATTGCAGCGGCCATCAGCGGTCACCCGGACAGCAAGGTGCACGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GAACCACCGCATCACGCCATCGTCCCCCTCCGCGGCTCCATCTCGGCGTCGGGCGACCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      CTTGACCCGCGGCCACTCGGCTGTCCGCCTCGTCGTCGAGGCGCTCACCAACTTCCT
                                                                                                                                                                                         CGGCTCGTCGCACGACCGA
```

1715 1664 1655

1595 1544

1604

1484

1424

1415 1364 1475 1235

1244

1064

764 878 824 938 988 998 1005

1178 1124

```
Я
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      ¥
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ¥
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            ᠮ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      ᡏ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        ¥
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     ₹
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             RESULT 10
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               ¥
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            ¥
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Я
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      ¥
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Ь
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              ¥
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      \forall
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Para-hydroxycinnamic acid; PHCA; food packaging; electronic connector; phenylalanine ammonia lyase; PAL; glucose; tyrosine ammonia lyase; TAL cytochrome p-450; cytochrome p-450 reductase; liquid crystal polymer; LCP; telecommunication; medical device; aerospace application; enzyme;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   R. glutinis phenylalanine ammonia lyase (PAL) mutant DNA,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           01-JUL-2002
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        AAD33100 standard; DNA; 2151 BP
                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Synthetic
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Rhodotorula glutinis
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    biocatalyst; mutant;
                                WO200210407-A1
                                                                                                                mutation
                                                                                                                                                                        mutation
                                                                                                                                                                                                                          mutation
                                                                                                                                                                                                                                                                                  mutation
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1944
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1845
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1785
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1824
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1956
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1896
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1884
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        2184
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             2076
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               2064
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      GAAGGTGAACAAGACGCTCGCCAAGCGCCTCGAGCAGACCAACTCGTACGACCTCGTCCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CGAGGTCAAGAAGGCGCTCAACAAGCGTCTCGAGCAGGACGACGACGTACGACCTCGAGCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GCGCTGGCACGACGCCTTCTCGTACGCGACCGGCACCGTCGTCGAGCCTCCTCCTCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CCTCCAGCAGCACCTCGGCACTGGCCTCGACGTCA------ACGCACTTGCGCT 1763
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CAAGATGCTCGCGTA 2198
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CTCGAACGTCTCCAAGATCTACGAGGCCATCAAGTCGGGCAGGATCAACAACGTCCTCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GAGCAACGTCTCGCGCATCTACGAGGCCATCAAGGACGGCCGCATCAACCACGTCCTCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             genegeceneckeececececeses en control of the control
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       GCCCGCGCTCTCGTACCTCTCGCCGCGCACTCAGATCCTCTACGCCTTCGTCCGCGAGGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            GGCCATCTCGCTCACCCGCCAAGTCCGCGAGACCTTCTGGTCCGCCGCGTCGACCTCGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       GGCCATCTCGCTCACGCGCGAGGTGCGCAACCGCTTCTGGCAGACGCCGTCTTCGCAGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GTC--
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 GCCCTCTGCCAACGTCACCCTTACTGCCGTCAACGCGTGGAAGGTTGCCTCGGCCGAGAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            GCGCTGGCACGACGCCTTCTCCTTCGCCGCCGCACCGTCGTCGAGGTCCTCTCGTCGAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   CATCGACCAGCACTTTGGCTCCGCCATGACCGGCTCGAACCTGCGCGACGAGCTCGTCGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           (first entry)
                                                                   replace(1619,
                                                                                                                                       replace(858, T)
/*tag= d
                                                                                                                                                                                            replace(792, A)
/*tag= c
                                                                                                                                                                                                                                                                                                         /product= "Rhodotorula glutinis
/EC_number= "4.3.1.5"
                                                                                                                                                                                                                                                                                                                                                                                                                         Location/Qualifiers
                                                                                                                                                                                                                                                                                                                                                                       *tag=
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               ---GCTCTCGCTCGCCGCCGTCAACGCCTGGAAGGTCGCCGCCGCCGAGTC
                                                                                                                                                                                                                                                                               number= "4.
lace(645, G)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 variant; gene; ds.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      2150
                                                                                                                                                                                                                                                                                                                                             mutant"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            EP18Km-6.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  . 2063
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1895
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1943
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1844
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1784
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1823
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1724
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        2183
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     2123
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1955
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            2003
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1883
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                2075
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             2015
```

```
5
                                                                                                                                                                                                                                                                                            밁
                                                                                                                                                                                                                                                                                                                                                                                     Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 children invention relates to merious to the product of a new hydroxycinnamic acid (HPCA). The invention relates to developing of a new conversion of glucose to PHCA by incorporation of the wild type phenylalanine ammonia lasse (PAL; EC 4.3.1.5) from the yeast Rhodotorula glutcinis into Escherichia coli underlying the ability of the wildtype PAL to convert tyrosine to PHCA. The invention is also directed to developing a new biocatalyst for conversion of glucose to PHCA by concorporation of the wildtype PAL which possesses enhanced tyrosine ammonia lyase (TAL) activity from the yeast Rhodotorula glutinis plus the plant cytochrome p-450 and the cytochrome p-450 reductase into E. coli.

Concorporation denocding mutant TAL enzyme is useful for producing PHCA by recombinant techniques. The recombinantly produced PHCA may be used as a monomer for production of liquid crystal polymers (ICP). ICP may be used in electronic connectors and telecommunication and aerospace applications. The presistance to sterilising radiation has also enabled these materials to be used in medical devices as well as chemical, and conference in this sequence is not shown in the specification, however it is constructed based on the PAL DNA shown as SEQ.ID.NO:7
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Matches 1565;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Query Match
Best Local Similarity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Novel nucleic acid encoding truncated mutant tyrosine ammonia lyase polypeptide, or mutant TAL polypeptide, useful for producing parahydroxycinnamic acid in recombinant host cell lacking cinnamate
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          WPI; 2002-280635/32
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      27-JUL-2000; 2000US-00627216
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     23-JAN-2001;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    07-FEB-2002
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Sequence 2151 BP; 382 A; 830 C; 565 G; 374 T; 0 U; 0 Other;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Disclosure; Page; 139pp; English
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     P-PSDB;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     The invention
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       (DUPO )
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      (AAD33075) in the sequence listing
                                                                                                                                                                                                                                                                                                                                                                                                339
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               225
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   279
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  165
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   159 селтесска сесесесност сеснестсення температест по температест с темп
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            44
55
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           9
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  DU PONT DE NEMOURS & CO E
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   CGCCCGCAAGGGGCGCAGAGGTCCGCGTCCAGAACGACGACGACGAGATCCGGCGCACGCGTCGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  gacceacrosacecrosaacerosaces en actores en contra de con
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           cacceacearcercerceaecracearacacearacacearcarcarcarcarcarcaceacea
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          gcaccrocccacaacccagercacecaeerceacarcerceaeaadaaecrocececece
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CGTCGCATCCGCAAAGCAGGCTGTCAATGGCGCCTCGACCAACCTCGCAGTCGCAGGCTC 104
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CGCCGCTCCGACCAAGTCGGCTGCGGGCCCCACTTCGGCTCTCCGCCGCCACGCCCCGGCCT 158
CGAGCACCAGCTCTGCGGCGTGACGCCGACGTCCGYCTCGTCCTTCAGCGTCGGACGCGG
                                                                                                                                                                                             TITCGGTGGCTCGGCCGACACGAGGACTGAGGATGCAGTCAGCCTCCAGAAGGCGCTCAT
                                                                                                                                                                                                                                                                                                      CAAATCGGTCGAGTTCTTGCGCTCGCAACTCTCCATGAGCGTCTACGGCGTCACGACTGG
                                                                                                                                                                                                                                                                                                                                                                                                     CAAGAGCGTCGACTTCCTCAAGGCCCAGCTTCAGAACTCGGTCTACGGAGTCACCACGGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CGCGAGGAAGGGCAGGCCTGTCCGCGTCAAGGACAGCGACAGATCCGCTCAAAGATTGA
                                                                                              ATTTGGCGGATCCGCAGACACCCGCACCGAGGACGCCATCTCGCTCCAGAAGGCTCTCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          2001WO-US002099
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                relates to methods
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         49.5%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         S.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Score 1196.6; DB 6;
Pred. No. 8.6e-181;
1; Mismatches 525;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 hods for biological production of para-
The invention relates to developing of
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Tang X,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ŗ.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ₹,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              DB 6;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Vannelli
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Length 2151
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Η.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     24;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Gaps
```

284

224

518

458 344 398

5 8 5

8 Ş

405

용양

```
TGCTTACGCTTCGGAGCTCGGCCACCTTGCCAACCCCGGTCACTACCTTCGTCCAGCCCGC
                                                                                                                                                                                                                                                                                                                    CCTCGCTGCCGAGGACCCGTCGCCTCAACTATCACGGCAAGGGCTTGGACATTCACATCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GTCGGCTGTCTCGATTTCGATGGAGAAGACCAGGCTCGCACTCGCCCTCATCGGCAAGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CCTCGCGGCCGAAGACCCCTCGCTCTCCTACCACTGCAAGGGCCTCGACATCGCCGCTGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         TGCCGCTGTGGCCAACACCATGGAGAGACTCGCCTCGGGCTCGCCCAGATCGGCAAGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GGGATTCTCCGCCAGGACCGCTACCCCTTGCGCACGTCTCCTCAGTGGCTCGGCCCGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             GGGCATICTICGCCAGGACCGCTACCCGCTCCGCACGTCGCCCTCAGTTCCTCGGCCCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CCTTTCCGGCTCGTCGTTTGCCGTTGAGCACGAGGAGGAGGAGGAGGAGGACGACGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   GCTCACGGCCATGACGGTCGAAGCGATGGTCGGCCACGCCGCTCGTTCCACCCCTTCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CGACAACCCTCTCATCGACGTCGAGAACAAGACTTCGCACCACGGCGGCAATTTCCAGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               CCTCGAGGGAAGCCGCTTTGCTGTCCACCATGAGGAGGAGGTCAAGGTCAAGGACGACGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CTTGACGGCTCTCACGGTGGAGGCCATGGTCGGCCAGCAGGGCTCCGTTCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       AGCATGGATGGCCACCCTCGCTCTGCACGACGCACACATGCTCTCGCTCTCGCAGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              TCACGACGTCACGCGCCCTCACCCGACGCAGATCGAAGTCGCGGGAAACATCCGCAAGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CGCCTCGAIGGCGACCCTCAGTCTGCACGACTCGCACATGCTCTCGCCTCCTCGCAGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CGAGGCAGTCGTCCTCGGCCCGAAGGAGGGTCTCGGTCTGGTCAACGGAACGGCCGTCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CGTCCACGAGGCAAGGAGAAGATCCTGTACGCCCGCGAGGCGATGGCGCTCTTCAACCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CTCTCCTCTCCTACATTGCAGCGGCCATCAGCGACCCGGACAGCAAGGTGCACGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CAACCACGGCATCACCCCCATCGTCCCCCCTCCGCGGCACCATCTCTGCGTCGGGCGACCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               CCTCGAGAACACGCTTCCGCCTCGAGGTCGTCCGCCGCGCCATGGTCATCCGCCGTCAACTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CGAGCCCGTCGTCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         TTTGCACGAGGAACCGAGAAGATCATGTTTGCGCGCGAGGCCATCTCGCTCTTTGGTCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      CAGCCCGCTCTCGTACATCGCCGGCGCCCATCACCGTCACGCTCAAGGTTCACGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                GAACCACCGCATCACGCCCATCGTCCCCCCCCCGCGCTCCATCTCGGCGTCGGGCGACCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    GCTCACGCGTGGCCACTCGGCCGTCGGCCTCGTCGTCCTTGAGGCGCTCACCAACTTCTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       TCTCGAGAACTCGCTTCCCCTCGAGGTTGTTCGCGGCGCCATGACAATCCGCGTCAACAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             CGAGCACCAGCTCTGCGGTGTTCTCCCTTCGTCGACTCGTTCCGCCTCGGCCGCGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              cescecea a contra de la contra del la contra della contra
                                                                     1595
                                                                                                                                          1484
                                                                                                                                                                                                                                                                                                                                              1475
                                                                                                                                                                                                                                                                                                                                                                                                               1364
                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1415
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1244
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1295
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1235
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1178
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1064
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1004
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1058
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         938
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     944
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      998
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              824
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               878
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           884
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 764
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  818
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       704
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     758
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          644
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               698
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     638
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    584
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             464
RESULT 11

AAD26924

ID AAD266

XX AD26

AC AAD26

XX Pheny
XX Pheny
XW Para-
XX Pheny
XW Para-
XW Para-
CS Synth
XX Rhodo
OS Synth
XX Rhodo
OS Synth
XX Key
FH Key
FT CDS
FT mutat
FT mutat
FT MV0200
XX
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      유 성
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   뫄
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              β
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ДĎ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   δ
                                                                                                                                                                                                                                                                                                                                                                                                                                 Phenylalanine ammonia-lyase; PAL; enzyme; cinnamate; food packing; PHCA para-hydroxycinnamic acid; tyrosine ammonia-lyase; TAL; medical device; Liquid Crystal Polymer; LCP; electronic connector; telecommunication; aerospace application; chemical; red yeast; mutant; ds.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Rhodotorula
                                    WO200111071-A2
                                                                                                                                                                                                                                                                                                                                          Synthetic.
                                                                                                                                                                                                                                                                                                                                                                           Rhodotorula
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  2136
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1944
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1845
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1785
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1725
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1764
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1884
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1665
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1605
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1545
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CAAGATGCTCGCGTA 2198
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                GCCCTCTGCCAACGTCACCCTTACTGCCGTCAACGCTGGAAGGTTGCCTCGGCCGAGAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               standard;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CTCGAACGTCTCCAAGATCTACGAGGCCATCAAGTCGGGCAGGATCAACAACGTCCTCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    GAGCAACGTCTCGCGCAICTACGAGGCCATCAAGGACGGCCGCATCAACCACGTCCTCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        GCTCGGCGTGCAGGCGCGCGCGGCGACCTTTTGTCGGCGTGCAGCAGCAGACGATCGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GCCCGCGCTCTCGTACCTCTCGCCGCGCACTCAGATCCTCTACGCCTTCGTCCGCGAGGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      edecarerede de la constanta de
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       GGCCATCTCGCTCACGCGAGGTGCGCAACCGCTTCTGGCAGACGCCGTCTTCGCAGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GAAGGTGAACAAGACGCTCGCCAAGCGCCTCGAGCAGCCAACTCGTACGACCTCGTCCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   CGAGGTCAAGAAGGCGCTCAACAAGCGTCTCGAGCAGCGACGACGTACGACCTCGAGCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          GCGCTGGCACGACGCCTTCTCCTTCGCCGCCGGCACCGTCGTCGAGGTCCTCTCGTCGAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   CATCGACCAGCACTTTGGCTCCGCCATGACCGGCTCGAACCTGCGCGACGAGCTCGTCGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CCTCCAGCACCTCGGCACTGGCCTCGACGTCA-----
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CGACTTGCGCGCGAGTTCGAGTTCAAGAAGCAGTTCGGCCCAGCCATCGTCTCGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CGACCTCCGCGCGCATGGAGCTCGACTTCAAGAAGCAGTTCGACCCGCTTCTCCCCGACTCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                GTCCAACGACGTCCTTTCTCTCCTCCTCGCCACCCACCTCTACTGCGTTCTCCAAGCCAT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        GGCCAACGACGTCCTTTCTCTCTCTCGCCTCGCACCCTGTACTGCACGCTCCAGGCCGT
                                                                                                                                                                                                                                                                                                                                                                           glutinis
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                glutinis mutant phenylalanine ammonia-lyase (PAL)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        (first
                                                                                       /*tag= a
/product= "R. '
replace(1619,
/*tag= b
                                                                                                                                                                                                                                        Location/Qualifiers
1. .2151
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           2151
                                                                                                                                      glutinis
T)
                                                                                                                                                                       mutant
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            ACGCACTTGCGCT
```

2183

2075 2123 2015

1955

2003 1895

2135

1943

1844 1883 1784 1823

1664

1604

Ş 밁 Ş

δ 뮍

1365

유 성 В Ş 유 성

DNA

B 8 문 Ş

1125

1065 1119 1005 1059 945 999 885 939 825 879 765

유

유영

5

45 45 45 46 46 46 46

```
Query Match
Best Local Similarity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Matches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      The invention relates to a method for producing para-hydroxycinnamic acid (PHCA). The method comprises converting cinnamate to PHCA by converting glucose to phenylalanine to PHCA through the phenyl ammonia-lyase (PAL) route or by generating a new biocatalyst possessing enhanced tyrosine ammonia-lyase (TAL) activity. The method is useful for the biological production of PHCA which is useful as a monomer for the production of Liquid Crystal Polymers (LCP), where the LCP is used in electronic connectors, telecommunications and aerospace applications. LCP is also useful in medical devices, as well as chemical, and food packing applications due to its resistance to sterilising radiation. The present sequence is a DNA encoding red yeast, Rhodotorula glutinis (Rhodosporidium toruloides) mutant PAL derived by substituting Ile at possition 540 with Thr. Mutant PAL enzyme possesse enhanced TAL activity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Producing para-hydroxycinnamic acid for producing liquid crystal polymer, comprises converting cinnamate to PHCA, glucose to PHCA by phenyl ammonia lyase route, or generating a biocatalyst with tyrosine ammonia-lyase
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      06-AUG-1999;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Sequence 2151 BP; 382 A; 830 C; 565 G; 374 T; 0 U; 0 Other;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Claim 13; Page 67-68; 75pp; English.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                P-PSDB;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     WPI; 2002-121549/16.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              03-AUG-2000; 2000WO-US021156
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   15-FEB-2001
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1565;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         159
                                                                                                                                                                                                                                                                                                                                                                                              279
                                                                                                                                                                                                                                                                                                                                                                                                                                      165
                                                                                                                405
                                                                                                                                                        459
                                                                                                                                                                                              345
                                                                                                                                                                                                                                   399
                                                                                                                                                                                                                                                                                                                   339
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              4.
U
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  AAE16390
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  덤
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 GCACCTGCCCACAACCCAGGTCACGCAGGTCGACATCGTCGAGAAGATGCTCGCCGCGCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Vannelli TM,
                                                                                                                                                                                                                                                                                                                                                                                                                                      GACCGACTCGACGCTCGAACTCGACGGCTACTCGCTCAACCTCGGAGACGTCGTCTCGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CGATGGCCACGCGGCACCAGTCGCAGCTCGAGATCGTGCAGGAGCTCCTCAGCGACCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CGCCGCTCCGACCAAGTCGGCTGCGGGCCCCACTTCGGCTCTCCGCCGCACGCCCCGCCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CACCGACGACGTCGTCGAGCTCAGCGGGTACAGCCTCACCGTCGACGTTGTCGGCGC
GCTCACGCGTGGCCACTCGGCCGTCCGCCTCGTCCTTGAGGCGCTCACCAACTTCTT
                                                                                                                                         CGAGCACCAGCTCTGCGGCGTGACGCCGACGTCCGYCTCGTCCTTCAGCGTCGGACGCGG
                                                                                                                                                                                                                                                                                                             CAAGAGCGTCGACTTCCTCAAGGCCCAGCTTCAGAACTCGGTCTACGGAGTCACCACGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CGTCGCATCCGCAAAGCAGGCTGTCAATGGCGCCTCGACCAACCTCGCAGTCGCAGGCTC
                                       TCTCGAGAACTCGCTTCCCCTCGAGGTTGTTCGCGGCGCCATGACAATCCGCGTCAACAG
                                                              CCTCGAGAACACGCTTCCGCTCGAGGTCGTCGCGGCGCCATGGTCATCCGCGTCAACTC
                                                                                                                     CGAGCACCAGCTCTGCGGTGTTCTCCCTTCGTCGTTCGACTCGTTCCGCCTCGGCCGCGG
                                                                                                                                                                                                ATTTGGCGGATCCGCAGACACCCGCACCGAGGACGCCATCTCGCTCCAGAAGGCTCTCCT
                                                                                                                                                                                                                                   TTTCGGTGGCTCGGCCGACACGAGGACTGAGGATGCAGTCAGCCTCCAGAAGGCGCTCAT
                                                                                                                                                                                                                                                                           CAMATCGGTCGAGTTCTTGCGCTCGCAACTCTCCATGAGCGTCTACGGCGTCACGACTGG
                                                                                                                                                                                                                                                                                                                                                      CGCGAGGAAGGGCAGGCCTGTCCGCGTCAAGGACAGCGACGAGATCCGCTCAAAGATTGA
                                                                                                                                                                                                                                                                                                                                                                                              CGCCGCAAGGGGCGCAGGGTCCGCGTCCAGAACGACGACGAGATCCGCGCACGCGTCGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                PONT DE NEMOURS &
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        99US-0147719F
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               49.5%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Qi WW,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Score 1196.6; DB 6;
Pred. No. 8.6e-181;
1; Mismatches 525;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Sariaslani S,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ħ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Gatemby
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      2151
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              24;
                                                                                                                                                                                                                                                                                                                                                                                                338
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   104
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        158
                                                                                                                                                                                                                                                                             344
                                                                                                                                                                                                                                                                                                                   398
                                                                                                                                                                                                                                                                                                                                                                                                                                                                             278
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     164
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         218
  638
                                       524
                                                                                                                     464
                                                                                                                                                                                                  404
                                                                                                                                                                                                                                        458
                                                                                                                                                                                                                                                                                                                                                                                                                                      224
                                                                                                                                                          518
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      밁
                  Ş
                                                          B
                                                                                              Ś
                                                                                                                                     밁
                                                                                                                                                                         Š
                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                δ
                                                                                                                                                                                                                                                                                              망
                                                                                                                                                                                                                                                                                                                                    Ş
                                                                                                                                                                                                                                                                                                                                                                             맑
                                                                                                                                                                                                                                                                                                                                                                                                                 Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    멍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1005
                                                                                                                                                                                                                                                                                                  1365
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1125
                                                                                                                                         1485
                                                                                                                                                                                                                     1425
                                                                                                                                                                                                                                                            1476
                                                                                                                                                                                                                                                                                                                                                                               1305
                                                                                                                                                                                                                                                                                                                                                                                                                                                             1245
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1059
                      1656
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           945
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          879
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            645
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               699
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     525
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   999
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            939
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    825
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 765
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             705
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    759
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CTTGACCCGCGCCACTCGGCTGTCCGCCTCGTCGTCGAGGCGCTCACCAACTTCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            GAACCACCGCATCACGCCCATCGTCCCCCTCCGCGGCTCCATCTCGGGGGTCGGGGGACCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               CGTCCACGAGGGCAAGGAGAGATCCTGTACGCCGCGAGGCGATGGCGCTCTTCAACCT
CGACCTCCGCGCGATGGAGCTCGACTTCAAGAAGCAGTTCGACCCGCTTCTCCCGACTCT
                                                                                                                                                                                                                                                                                                                               CCTCGCTGCCGAGGACCCGTCGCTCAACTATCACGGCAAGGGCTTGGACATTCACATCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CGACAACCCGCTCCTCGACGTCGAGAACAAGCAGACCGCGCACGGCGCAACTTCCAGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GGGCATTCTTCGCCAGGACCGCTACCCGCTCCGCTCCACTTCCTCCGCCCCGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             TCACGACGTCACGCGCCCTCACCCGACGCAGATCGAAGTCGCGGGAAACATCCGCAAGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      CCACGACGTCTGCCGCCCCGCACCCCGGCCAGGTCGAGGTCGCGCGCAACATCCGCACGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GCTCACGGCCATGACGGTCGAAGCGATGGTCGGCCACGCCGGCTCGTTCCACCCCTTCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            cricacecroreacececarecrosececececececececececececececerecar
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    AGCATCGATGGCCACCCTCGCTCTGCACGACGCACACATGCTCTCGCTCTCGCAGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               CGCCTCGATGGCGACCCTCAGTCTGCACGACTCGCACATGCTCTCGCTCCTCCGCAGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 CGAGCCCGTCGTCCGCCCGAAGGAGGGTCTCGGTCTCGTCAACGGCACCGCCGTCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CGAGGCAGTCGTCCTCGGCCCGAAGGAGGGTCTCGGTCTCGGTCAACGGAACGGCCGTCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  TTTGCACGAGGGAACCGAGAGATCATGTTTGCGCGCGAGGCCATCTCGCTCTTTGGTCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            crerecrerectaeatrocaeceaeceareaeceáreacecegaeaecaecaaecaecer
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               CAGCCCGCTCTCGTACATCGCCGGCGCCATCACCGGTCACCCCGACGTCAAGGTTCACGT
                                                                                         GGCCAACGACGTCCTTCTCTCTCTCGCCTCGCACCTGTACTGCACGCTCCAGGCCGT
                                                                                                                                                                                                                                                                                                                                                                               CAACTTCACGCAGCTCACCGAGATGCTCAACGCCGGCATGAACCGCGGCCTCCCCTCCTG
                                                                                                                                                                                                                                                                                                                                                                                                                     саасттелеесаетесаесаеттестелаесствессательсесесесствесттесте
                                                                                                                                                                                                                                                                                                                                                                                                                                                             TGCCGCTGTGGCCAACACCATGGAGAAGACTCGCCTCGGGCTCGCCCAGATCGGCAAGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                GTCGGCTGTCTCGATTTCGATGGAGAAGACCAGGCTCGCACTCGCCCTCATCGGCAAGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CGACAACCCTCTCATCGACGTCGAGAACAAGACTTCGCACCACGGCGCAATTTCCAGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     gescarrerececcaseaceseracecerrececacererececasisses
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CCTCGAGGGAAGCCGCTTTGCTGTCCACCATGAGGAGGAGGTCAAGGTCAAGGACGACGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CCTTTCCGGCTCGTCGTTTGCCGTTGAGCACGAGGAGGAGGTCAAGGTCAAGGACGACGA 1118
                                                                                                                                         TGAGATGGCGAACCAGGCGTCAACTCGCTTGCGCTCATCTCGGCTCGTCGCACGACCGA
                                                                                                                                                                         GGCGTACACCTCGGAGTTGGGACACCTCGCCAACCCTGTGACGACGCATGTCCAGCCGGC
                                                                                                                                                                                                                                                      TGCTTACGCTTCGGAGCTCGGCCACCTTGCCAACCCGGTCACTACCTTCGTCCAGCCCGC
                                                                                                                                                                                                                                                                                                    CCTCGCGGCCGAAGACCCCTCGCTCTCCTACCACTGCAAGGGCCTCGACATCGCCGCTGC
                                                                CCCACCTCTACTGCGTTCTCCAAGCCAT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1058
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                938
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             878
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1178
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        818
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           644
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 698
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       584
                                                                                                      1655
                                                                                                                                                                                 1595
                                                                                                                                                                                                                                                                                                      1424
                                                                                                                                                                                                                                                                                                                                            1475
                                                                                                                                                                                                                                                                                                                                                                                                                         1415
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1355
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1295
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1184
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1235
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1124
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1004
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             944
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  998
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                704
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      758
                           1715
                                                                  1604
                                                                                                                                              1544
                                                                                                                                                                                                                         1484
                                                                                                                                                                                                                                                                 1535
                                                                                                                                                                                                                                                                                                                                                                                    1364
                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1304
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1244
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          884
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 764
```

1064

Ś

Ś

ő 멂 Ś 밁 Ş 밁 Ş 밁

В

Ş 밁 8 Дb Š

밁

acid and activity

and

```
WPI; 2003-058928/05
                                                               Qi WW,
                                                                                                                                                                                                                        03-MAY-2002; 2002WO-US018551
                                                                                                                                                                                                                                                                               14-NOV-2002
                                                                                                                                                                    04-MAY-2001; 2001US-0288701P.
                                                                                                                                                                                                                                                                                                                                     WO200290523-A2
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Rhodtorula glutinis.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    R. glutinis DNA encoding PAL/TAL naturally occurring variant.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 27-JAN-2003
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     ABS56543;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           ABS56543
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         gene; phenylalanine ammonia-lyase; PAL; phenylalanine hydroxylase; para-hydroxycinnamic acid; tyrosine ammonium lyase; TAL; PAL/TAL; osine; cinnamic acid; PHCA; liquid crystal polymer.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                2136
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    2184
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           2076
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   2016
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       2064
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1956
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              2004
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1896
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1845
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1884
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1785
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1725
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1764
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1944
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1824
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1665
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1605
                                                            Sariaslani
                                                                                                                DU PONT DE NEMOURS & CO
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         standard; DNA; 2151 BP
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CAAGATGCTCGCTTA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           GAGCAACGTCTCGCGCATCTACGAGGCCATCAAGGACGGCCGCATCAACCACGTCCTCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             GAAGGTGAACAAGACGCTCGCCAAGCGCCTCGAGCAGACCAACTCGTACGACCTCGTCCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        GCTCGGCGTGCAGGCGCCGCCGCCGACGTGTTTTGTCGGCGTGCAGCAGGAGACGATCGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CAAGATGCTCGCGTA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                GGCCATCTCGCTCACGCGCGAGGTGCGCAACCGCTTCTGGCAGACGCCGTCTTCGCAGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GCCCTCTGCCAACGTCACCCTTACTGCCGTCAACGCGTGGAAGGTTGCCTCGGCCGAGAA 1943
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             GCGCTGGCACGACGCCTTCTCGTACGCGACCGGCACCGTCGAGCTCCTCCTCCTCCTCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CTCGAACGTCTCCAAGATCTACGAGGCCATCAAGTCGGGCAGGATCAACAACGTCCTCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        GCCCGCGCTCTCGTACCTCTCGCCGCGCACTCAGATCCTCTACGCCTTCGTCCGCGAGGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GGCCATCTCGCTCACCCGCCAAGTCCGCCGAGACCTTCTGGTCCGCCGCCGCCGTCGACCTCGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          GTC-----GCTCTCGCTCGCCCCCCGTCAACGCCTGGAAGGTCGCCGCCGAGTC 1895
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GCGCTGGCACGACGCCTTCTCCTTCGCCGCCGGCACCGTCGTCGAGGTCCTCTCGTCGAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CGAGGTCAAGAAGGCGCTCAACAAGCGTCTCGAGCAGGACGACGTACGACCTCGAGCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CATCGACCAGCACTTTGGCTCCGCCATGACCGGCTCGAACCTGCGCGACGAGCTCGTCGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            ccrccaccaccaccrcccccccccccccccc-----
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CGACTTGCGCGCGACCGAGTTCGAGTTCAAGAAGCAGTTCGGCCCAGCCATCGTCTCGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 (first
                                                                                                                                                                                                                                                                                                                                                                                         /product= "PAL/TAL"
                                                                                                                                                                                                                                                                                                                                                                                                              /*tag=
                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Location/Qualifiers
                                                                                                                                                                                                                                                                                                                                                                                                                                                . .2151
                                                            ES,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              entry)
                                                         Tang
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             2150
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 2198
                                                                                                                Ħ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              -ACGCACTTGCGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     2135
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         2183
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                2075
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         2063
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 2123
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        2015
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1955
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      2003
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1844
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1883
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1784
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1823
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1664
                            Ś
                                                                                                                                                                                           밁
                                                                                                                                                                                                                                            S
                                                                                                                                                                                                                                                                                                                                                 Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ş
                                                                                                                         Ş
                                                                                                                                                                                                                                                                                                   В
                                                                                                                                                                                                                                                                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                            Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           The invention relates to a recombinant host comprising at least one gene concoding a tyrosine ammonium lyase (TAL) activity, and at least one gene encoding a phenylalanine hydroxylase (pAH) activity. Also included are: (C (1) a method for producing para-hydroxycinnamic acid involving: (1) providing the recombinant host; and (2) growing the recombinant organism in the presence of a fermentable carbon substrate and thus producing para chydroxycinnamic acid; (2) method for producing tyrosine involving: (1) providing a recombinant organism comprising at least one gene encoding a cid phenylalanine hydroxylase activity; and (2) growing the recombinant organism in the presence of a fermentable carbon substrate to produce tyrosine. The recombinant host cell is used for producing para-hydroxycinnamic acid and tyrosine. Increasing the carbon flow into the production of para-hydroxycinnamic acid (PHCA) which is useful as a consomer for the production of liquid crystal polymer. The present consorted the production of para-hydroxycinnamic acid (PHCA) which is useful as a consorted consorted an aturally occurring variant of the R. glutinis produce encodes a naturally occurring variant of the R. glutinis construction of para-hydroxycinnamic acid (PHCA) which has TAL activity (PALI/TALI)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Query Match
Best Local Sim:
Matches 1565;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Sequence 2151 BP;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Novel recombinant host for producing para-hydroxycinnamic tyrosine, comprises gene encoding tyrosine ammonium lyase gene encoding phenylalanine hydroxylase activity.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Example 4; Page 66-67;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               P-PSDB; ABG71255
                                  699
                                                                                                                                       639
                                                                                                                                                                                              525
                                                                                                                                                                                                                                                  579
                                                                                                                                                                                                                                                                                                      465
                                                                                                                                                                                                                                                                                                                                                          519
                                                                                                                                                                                                                                                                                                                                                                                                                405
                                                                                                                                                                                                                                                                                                                                                                                                                                                                  459
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        345
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            995
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   285
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    339
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           225
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  279
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      165
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          219
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                105
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    159
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           <u>4</u>
Մ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            99
CAGCCCGCTCTCGTACATCGCCGGCGCCATCACCGGTCACCCCGACGTCAAGGTTCACGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Similarity
                                                                                                                         GAACCACCGCATCACGCCCATCGTCCCCCTCCGCGGCTCCATCTCGGCGTCGGCGACCT
                                                                                   CAACCACGGCATCACCCCCATCGTCCCCCTCCGCGCACCATCTCTGCGTCGGGCGACCT
                                                                                                                                                                                              CTTGACCCGCGGCCACTCGGCTGTCCGTCGTCGTCGAGGCGCTCACCAACTTCCT
                                                                                                                                                                                                                                                                                                                                        CCTCGAGAACACGCTTCCGCTCGAGGTCGTCCGCGGCGCCATGGTCATCCGCGTCAACTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CGCCGCTCCGACCAAGTCGGCTGCGGGCCCCACTTCGGCTCTCCGCCGCACGCCGGCCT 158
                                                                                                                                                                                                                                               GCTCACGCGTGGCCACTCGGCCGTCGCCTCGTCGTTGAGGCGCTCACCAACTTCTT
                                                                                                                                                                                                                                                                                                      TCTCGAGAACTCGCCTTCCCCTCGAGGTTGTTCGCGGCGCCATGACAATCCGCGTCAACAG
                                                                                                                                                                                                                                                                                                                                                                                                                CGAGCACCAGCTCTGCGGTGTTCTCCCTTCGTCGTTCGACTCGTTCCGCCTCGGCCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                   ATTTGGCGGATCCGCAGACACCCGCACCGAGGACGCCATCTCGCTCCAGAAGGCTCTCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            TTTCGGTGGCTCGGCCGACACGAGGACTGAGGATGCAGTCAGCCTCCAGAAGGCGCTCAT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   CAAATCGGTCGAGTTCTTGCGCTCGCAACTCTCCATGAGCGTCTACGGCGTCACGACTGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CAAGAGCGTCGACTTCCTCAAGGCCCAGCTTCAGAACTCGGTCTACGGAGTCACCACGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CGCGAGGAAGGGCAGGCCTGTCCGCGTCAAGGACAGCGACGAGATCCGCTCAAAGATTGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            сесссесь в предоставления предоставле
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   GACCGACTCGAACTCGAACTCGACGGCTACTCGAACCTCGGAGACGTCGTCTCGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CACCGACGACGTCGTCGAGCTCAGCGGGTACAGCCTCACCGTCGTGACGTTGTCGGCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                GCACCTGCCCACAACCCAGGTCACGCAGGTCGACATCGTCGAGAAGATGCTCGCCGCGCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ceareeccacecaceacaercecaecrocaearicerearicerecaeaaccrocrocaeceaecc
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CGTCGCATCCGCAAAGCAGGCTGTCAATGGCGCCTCGACCAACCTCGCAGTCGCAGGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        382 A; 830 C; 565 G; 374 T; 0 U; 0 Other;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       49.5%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              69pp; English
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Score 1196.6; DB 7
Pred. No. 8.6e-181;
1; Mismatches 525;
```

525; Indels 7;

24;

Gaps

w ••

164

218

104

758 644 869 584 638 578

464 518 404 458 398 284 338 224 278

344

524

Length

뮍 Ş

Ş Дb Ş В 5 밁 8 占 8 В Ś D, δ 망 δ 밁

```
1365
                                                                                                                                                                                                                                                                                                                                                                                                                                                  1416
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1305
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1356
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1245
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1296
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1185
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1236
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1125
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1179
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1065
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1119
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1005
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1059
                                       1665
                                                                            1716
                                                                                                               1605
                                                                                                                                                  1656
                                                                                                                                                                                     1545
                                                                                                                                                                                                                           1596
                                                                                                                                                                                                                                                                1485
                                                                                                                                                                                                                                                                                                   1536
                                                                                                                                                                                                                                                                                                                                        1425
                                                                                                                                                                                                                                                                                                                                                                           1476
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       945
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           999
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              885
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   939
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    825
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          879
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             765
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                819
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     705
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        759
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              645
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   GTCGGCTGTCTCGATTTCGATGGAGAAGACCAGGCTCGCACTCGCCCTCATCGGCAAGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GGCATTCTCCGCCAGGACCGCTACCCCTTGCGCACGTCTCCTCAGTGGCTCGGCCCGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GGGCATTCTTCGCCAGGACCGCTACCCGCCTCCGCACGTCGCCTCAGTTCCTCCGCCCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GCTCACGGCCATGACGGTCGAAGCGATGGTCGGCCACGCCGGCTCGTTCCACCCCTTCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     TTTGCACGAGGGAACCGAGAAGATCATGTTTGCGCGCGAGGCCATCTCGCTCTTTGGTCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    TGCCGCTGTGGCCAACACCATGGAGAAGACTCGCCTCGGGCTCGCCCAGATCGGCAAGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             CCTCGAGGGAAGCCGCTTTGCTGTCCACCATGAGGAGGTCAAGGTCAAGGACGACGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CCTTTCCGGCTCGTCGTTTGCCGTTGAGCACGAGGAGGAGGTCAAGGTCAAGGACGACGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CCACGACGTCTGCCGCCCGCCACCCCGGCCAGGTCGAGGTCGCGCGCAACATCCGCACGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      AGCATCGATGGCCACCCTCGCTCTGCACGACGCACACATGCTCTCGCTCCTCCTCGCAGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CGCCTCGATGGCGACCCTCAGTCTGCACGACTCGCACATGCTCTCGCCTCCTCTCGCAGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               CGAGCCCGTCGTCCTCGGCCCGAAGGAGGGTCTCGGTCTCGTCAACGGCACCGCCGTCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CGAGGCAGTCGTCCTCGGCCCGAAGGAGGGTCTCGGTCTGGTCAACGGAACGGCCGTCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CTCTCCTCTCCTACATTGCAGCGGCCATCAGCGGTCACCCGGACAGCAAGGTGCACGT
                                                                                                                                                                                                                     GGCCAACGACGTCCTTTCTCCTTCTCGCCTCGCACCTGTACTGCACGCTCCAGGCCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CGACAACCCTCTCATCGACGTCGAGAACAAGACTTCGCACCACGGCGGCAATTTCCAGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         TCACGACGTCACGCGCCCTCACCCGACGCAGATCGAAGTCGCGGGAAACATCCGCAAGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 crreacegereracegecaregreesecagecagecreerresrecececerrear
                                                                                                                                                                                                                                                                                                                                      GECGTACACCTCGGAGTTGGGACACCTCGCCAACCCTGTGACGACGCATGTCCAGCCGGC
                                                                                                                                                                                                                                                                                                                                                                         Tectracectroegaectecectroccaacccegreactacctacctrocaecccec
                                                                                                                                                                                                                                                                                                                                                                                                               CCTCGCGGCCGAAGACCCCTCGCTCTCCTACCACTGCAAGGGCCTCGACATCGCCGCTGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                CCTCGCTGCCGAGGACCCGTCGCTCAACTATCACGGCAAGGGCTTGGACATTCACATCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CGAGGTCAAGAAGGCGCTCAACAAGCGTCTCGAGCAGACGACGACGTACGACCTCGAGCC
                                       CATCGACCAGCACTTTGGCTCCGCCATGACCGGCTCGAACCTGCGCGACGAGCTCGTCGA
                                                                            CCTCCAGCAGCACCTCGGCACTGGCCTCGACGTCA-----ACGCACTTGCGCT
                                                                                                                 CGACTTGCGCGCGACCGAGTTCGAGTTCAAGAAGCAGTTCGGCCCAGCCATCGTCTCGCT
                                                                                                                                                CGACCTCCGCGATGGAGCTCGACTTCAAGAAGCAGTTCGACCCGCTTCTCCCGACTCT
                                                                                                                                                                                       GTCCAACGACGTCCTTCTCTCCTCCTCGCCACCCACCTCTACTGCGTTCTCCAAGCCAT
                                                                                                                                                                                                                                                                TGAGATGGCGAACCAGGCGGTCAACTCGCTTGCGCTCATCTCGGCTCGTCGCACGACCGA
                                                                                                                                                                                                                                                                                                 1823
                                           1724
                                                                                                                                                                                                                               1655
                                                                                                                                                                                                                                                                                                     1595
                                                                                                                                                                                                                                                                                                                                                                             1535
                                                                                                                                                                                                                                                                                                                                                                                                                                                      1475
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1415
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1304
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1355
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1244
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1295
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1235
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1124
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1178
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1064
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1118
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1004
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1058
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    878
                                                                            1763
                                                                                                                                                    1715
                                                                                                                                                                                         1604
                                                                                                                                                                                                                                                                                                                                          1484
                                                                                                                                                                                                                                                                                                                                                                                                                   1424
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1364
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1184
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     998
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        884
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           938
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               824
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          818
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              704
                                                                                                                 1664
                                                                                                                                                                                                                                                                    1544
```

```
밁
                                                                                                                                                                                                                                                                                                                                                                                                                                  8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                δ
뮍
                                                                                                    Š
                                                                                                                                                                                                                                                                                                     片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                    2124
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1956
                                                                                                                                                                                                                                                                                                                      2076
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            2016
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  2064
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         2004
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1896
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1944
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1845
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1824
                                                                                                                                                                                                                                                                                                                                                                                                                                  GAGCAACGTCTCGCGCATCTACGAGGCCATCAAGGACGGCCGCATCAACCACGTCCTCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CAAGATGCTCGCTTA
                                                                                                                                                      CAAGATGCTCGCGTA
                                                                                                                                                                                                                                                                                                             CTCGAACGTCTCCAAGATCTACGAGGCCATCAAGTCGGGCAGGATCAACAACGTCCTCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            GCTCGGCGTGCAGGCGCGCCGCGGCGACGTGTTTGTCGGCGTGCAGCAGGAGACGATCGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GCCCGCGCTCTCGTACCTCTCGCCGCGCACTCAGATCCTCTACGCCTTCGTCCGCGAGGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                фесоворовать по предостать по предостать
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       GGCCATCTCGCTCACCCGCCAAGTCCGCGAGACCTTCTGGTCCGCCGCGTCGACCTCGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              eeccarcreecreaceceaeereceaacecrarcreecaeaececercrreecaeec
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            GCCCTCTGCCAACGTCACCCTTACTGCCGTCAACGCGTGGAAGGTTGCCTCGGCCGAGAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   dederrede Acea e de recentra de consecue de consecuencia de co
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             -- GCTCTCGCTCGCCGCCGTCAACGCCTGGAAGGTCGCCGCCGCCGAGTC
        . 2150
                                                                                                                                                      2198
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1895
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1943
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             2183
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    2075
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           2123
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  2015
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1955
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       2003
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1844
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         2063
                                                                                                                                                                                                                                                                                                                                               2135
```

```
ADE360LT 13
ADE360LS
ID ADE36
AC ADE36

                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         recombination; nucleic acid template; recombined polypeptide, altered property; combined gene; gene; ds.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Rhodosporidium
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                29-JAN-2004
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             ADE36055
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Rhodosporidium.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     altered
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        ADE36055
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        WO2003072743-A2
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             property; combined
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 standard;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                (first
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        glutinis
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 DNA;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                entry)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 2151
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               EP18Km-6
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 gene;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ВP
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 gene;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               mutant PAL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               encoding
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   DNA SEQ ID
```

NO: 3

26-FEB-2003; 2003WO-US005708 04-SEP-2003

Š 밁 밁 Ŋ, В Ş 밁

Ś

밁

Ŋ

Ş

밁

λč

맑 Ş 밁 Š 밁 문 Ş 밁 Ş 밁

8

Milano 2003-721766/68. DB; ADE36056. 딕 Tang ×

-PSDB;

26-FEB-2002; 2002US-0360279P

(DUPO)

DU PONT DE NEMOURS & CO

(X)

Recombination of nucleic enzymes with altered prop leic acid templates, useful e.g. properties, is based on cyclic . for producing extension of unpaired

2 SEQ ID NO 3; 481pp; English.

The present invention describes a method for the recombination of nucleic acid (NA) templates. The method comprises: (a) providing at least two double-stranded templates (T1, T2) having different 5' and 3' regions in their sense strands; be contacting the templates with at least one each of forward and reverse primers that anneal, respectively, only to the 3'-region of the antisense strand of T1 and to the 3'-region of the sense strand of T2; (c) extending the primers by no more than 1000 nucleotides

g Ş

1725

1784

Ś 밁 Ş B Ş В Š 밁 Ş 뮍

B

```
당
                                                                                                                                                                                                             Š
                                                                                                                                                                                                                                                                 멍
                              Ş
                                                                                                                Ş
                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                                       δ
                                                                                                                                                                                                                                                                                                                                                      g
                                                                                                                                                                                                                                                                                                                                                                                                      Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                          В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Дb
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          β
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 망
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                뮹
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ъ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      cc (nt); (d) separating extended primers from their templates; (e) creammealing the extended primers, to either template; and (f) repeating cc (yrless of steps (b)-(e) until at least one full-length extension product, i.e. a recombination of T1 and T2, is obtained. Also described: (1) at cm ethod starting from at least one each of antisense and sense single-stranded templates; (2) generating a recombined polypeptide (1) with C2 altered properties by expressing recombination products of the new cc processes and screening the polypeptides formed for properties different cc from those of polypeptides from either of the templates; and (3) (1) produced by method (2). The methods are useful for the recombined cc nucleic acid templates of interest, and generation of a recombined cc polypeptide having altered properties. The method can be used to make combined genes that express proteins e.g. enzymes, cytokines, growth cf actors, viral proteins or microbial antigens with altered properties, e.g. stability, activity or specificity. The present sequence is used in the exemplification of the present invention.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Matches 1565; Conserv
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Query Match
Best Local
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Sequence 2151 BP; 382 A; 830 C; 565 G; 374 T; 0 U; 0 Other;
                                   819
                                                                             705
                                                                                                                          759
                                                                                                                                                                            645
                                                                                                                                                                                                                       699
                                                                                                                                                                                                                                                                    585
                                                                                                                                                                                                                                                                                                                   639
                                                                                                                                                                                                                                                                                                                                                                   525
                                                                                                                                                                                                                                                                                                                                                                                                                                                             465
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          519
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         405
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    459
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   345
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                399
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                285
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          339
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          225
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         279
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         165
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   105
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                159
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            99
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               45
CGAGGCAGTCGTCCTCGGCCCGAAGGAGGGTCTCGGTCTAGGCAACGGAACGGCCGTCTC
                                                                             CGTCCACGAGGGCAAGGAGAAGATCCTGTACGCCCGCGAGGCGATGGCGCTCTTCAACCT
                                                                                                           TTTGCACGAGGGAAACCGAGAAGATCATGTTTGCGCGCGGGGGCCATCTCGCTCTTTGGTCT
                                                                                                                                                                                                        CAGCCCGCTCTCGTACATCGCCGGCCATCACCGGTCACCCCGACGTCAAGGTTCACGT
                                                                                                                                                                                                                                                                                                            GAACCACCGCATCACGCCCATCGTCCCCCTCCGCGGCTCCATCTCGGCGTCGGGCGACCT
                                                                                                                                                                                                                                                                                                                                                                                            GCTCACGCGTGGCCACTCGGCCGTCGTCGTCGTCGTTCACCACCAACTTCTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      CCTCGAGAACACGCTTCCGCTCGAGGTCGTCGCGGGGGCCATGGTCATCCGCGTCAACTC
                                                                                                                                                                       CTCTCCTCTCCTACATTGCAGCGGCCATCAGCGGTCACCCGGACAGCAAGGTGCACGT
                                                                                                                                                                                                                                                                 CAACCACGGCATCACCCCCATCGTCCCCCCCCGCGCACCATCTCTGCGTCGGGCGACCT
                                                                                                                                                                                                                                                                                                                                                           CTTGACCCGCGGCCACTCGGCTGTCCGCCTCGTCGTCGAGGCGCTCACCAACTTCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                          TCTCGAGAACTCGCTTCCCCTCGAGGTTGTTCGCGGCGCCATGACAATCCGCGTCAACAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CGAGCACCAGCTCTGCGTGTTCTCCCTTCGTCGTTCGACTCGTTCCGCCTCGGCCGCGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CGAGCACCAGCTCTGCGGCGTGACGCCGACGTCCGYCTCGTCCTTCAGCGTCGGACGCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ATTTGGCGGATCCGCAGACACCCGCACCGAGGACGCCATCTCGCTCCAGAAGGCTCTCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              TTTCGGTGGCTCGGCCGACACGAGGACTGAGGATGCAGTCAGCCTCCAGAAGGCGCTCAT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CAAGAGCGTCGACTTCCTCAAGGCCCAGGTTCAGAACTCGGTCTACGGAGTCACCACGGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   CGCCGCAAGGGGCGCAGGGTCCGCGTCCAGAACGACGACGAGGAGATCCGCGCACGCGTCGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 GACCGACTCGACGCTCGACCGCTACTCGCTCAACCTCGGAGACGTCGTCTCGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           GCÁCCTGCCCACAACCCAGGTCACGCAGGTCGACATCGTCGAGAAGATGCTCGCCGCGCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CGATGGCCACGCGCACCAGTCGCAGCTCGAGATCGTGCAGGAGCTCCTCAGCGACCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CAAATCGGTCGAGTTCTTGCGCTCGCAACTCTCCATGAGCGTCTACGGCGTCACGACTGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            сассаасвасетсетсваестсаесветаем положение положение страновае положение полож
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CGCCGCTCCGACCAAGTCGGCTGCGGGCCCCACTTCGGCTCTCCGCCGCCACCCCGGCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CGCGAGGAAGGGCAGGCCTGTCCGCGTCAAGGACAGCGACGAGATCCGCTCAAAGATTGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CGTCGCATCCGCAAAGCAGGCTGTCAATGGCGCCTCGACCAACCTCGCAGTCGCAGGCTC 104
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           49.5%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Score 1196.6; DB 9; Length Pred. No. 8.6e-181; 1; Mismatches 525; Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    24;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    2151
                                                                                                                                                                     704
                                                                                                                                                                                                                  758
                                                                                                                                                                                                                                                                                                                                                                                                                                                        524
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       578
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 518
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    338
                                                                                                                                                                                                                                                                                                              698
                                                                                                                                                                                                                                                                                                                                                              584
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    464
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 404
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              450
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           344
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       284
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           218
     밁
                                   5
                                                                                               뮍
                                                                                                                                  Ş
                                                                                                                                                                                         밁
                                                                                                                                                                                                                              Ş
                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                             Ś
                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                            밁
                                                                                                                                                                                                                                                                                                                                                                                                                       Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        맑
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           맑
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  B
                                                                                                                                                                                                                                                                                        1665
                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1545
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1485
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1365
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1536
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1476
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1356
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1245
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1185
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1125
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1179
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1005
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1059
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              999
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              885
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     879
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    765
                                        GCCCTCTGCCAACGTCACCCTTACTGCCGTCAACGCGTGGAAGGTTGCCTCGGCCGAGAA 1943
     GIC
                                                                                                                                              GCGCTGGCACGACGCCTTCTCGTACGCGACCGGCACCGTCGTCGAGCTCCTCTCGTCCTC
                                                                                                                                                                                                                         CGAGGTCAAGAAGGCGCTCAACAAGCGTCTCGAGCAAGACGACGACGTACGACCTCGAGCC
                                                                                                                                                                                                                                                                                                                           CCTCCAGCAGCACCTCGGCACTGGCCTCGACGTCA-----ACGCACTTGCGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          GGCCAACGACGTCCTTTCTCTCTCTCGCCCTCGCACCTGTACTGCACGCTCCAGGCCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CATCGÁCCAGCACTTTGGCTCCGCCATGACCGGCTCGAACCTGCGCGACGAGCTCGTCGA
                                                                                                                                                                                                                                                                                                                                                                                  CGACTTGCGCGCGACCGAGTTCGAGTTCAAGAAGCAGTTCGGCCCAGCCATCGTCTCGCT
                                                                                                                                                                                                                                                                                                                                                                                                                            cgaccrececegaregaecregaerreaagaagcaerregaecececrrereceaerer
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      TGAGATGGCGAACCAGGCGGTCAACTCGCTTGCGCTCATCTCGGCTCGTCGCACGACCGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GGCGTACACCTCGGAGTTGGGACACCTCGCCAACCCTGTGACGACGCATGTCCAGCCGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             TGCTTACGCTTCGGAGCTCGGCCACCTTGCCAACCCGGTCACTACCTTCGTCCAGCCCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               CCTCGCGGCCGAAGACCCCTCGCTCTCCTACCACTGCAAGGGCCTCGACATCGCCGCTGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CCTCGCTGCGAGGACCCGTCGCTCAACTATCACGGCAAGGGGCTTGGACATTCACATCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           GTCGGCTGTCTCGATTCGATGGAGAAGACCAGGCTCGCACTCGCCCTCATCGGCAAGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CGACAACCCTCTCATCGACGTCGAGAACAAGACTTCGCACCACGGCGCAATTTCCAGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CGACAACCCGCTCCTCGACGTCGAGAACAAGCAGGACGCGCGCACGGCGAGCTTCCAGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    GGGCATTCTTCGCCAGGACCGCTACCCGCTCCGCACGTCGCCTCAGTTCCTCGGCCCCGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     TGCCGCTGTGGCCAACACCATGGAGAAGACTCGCCTCGGGCTCGCCCAGATCGGCAAGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CTTTCCGCCTCGTCGTTTGCCGTTGACCACGAGGAGGAGGTCAAGGTCAAGGACGACGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           GCTCACGGCCATGACGGTCGAAGCGATGGTCGGCCACGCCTCGTTCCACCCCTTCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CITGACGGCICTCACGGTGGAGGCCATGGTCGGCCAGCAGGGCTCGTTCGCGCCGTTCAT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CCTCGAGGGAAGCCGCTTTGCTGTCCACCATGAGGAGGTCAAGGTCAAGGACGACGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               TCACGACGTCACGCCCTCACCCGACGCAGATCGAAGTCGCGGGAAACATCCGCAAGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CCACGACGTCTGCCGCCCGCACCCCCGGCCAGGTCGAGGTCGCGCCAACATCCCGCACGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        AGCATCGATGGCCACCCTCGCTCTGCACGACGCACACATGCTCTCGCTCCTCGCAGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  ceccrcearecercaercrecaeacrecaeacarecrerecreercreercreercreercreercreer
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CGAGCCCGTCGTCCTCGGCCCGAAGGAGGGTCTCGGTCTCGTCAACGGCACCGCCGTCTC
     - GCTCTCGCTCGCCGCCGTCAACGCCTGGAAGGTCGCCGCCGCCGAGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1535
     1895
                                                                                                                                                                                                                                                                                                                                                                                  1664
                                                                                                                                                                                                                                                                                                                                                                                                                               1715
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1655
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1544
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1484
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1475
                                                                                                                                              1883
                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1604
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1424
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1415
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1304
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1355
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1244
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1295
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1235
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1124
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1064
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1118
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1004
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1058
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           944
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        998
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     884
```

```
RESULT 14
NAN81101
                       Ŋ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ያ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          ¥
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     岁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           ž
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      岁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          ž
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        ႘
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           ¥
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    27-AUG-2003
25-MAR-2003
19-NOV-1990
                                           plasmids were from E.coli MT 10414 (FermP-8876) carrying the plasmid pytrp6 contg. the structural gene for PAL from Rhodosporidium toruloides. Inventors claim a recombinant plasmid contg. a DNA sequence coding for PAL with the SQ in AAP80501. Procedure for cloning the structural gene for PAL (AAN81101) is described as a reference example. The hybrid plasmid permits more efficient expression of PAL in E.coli. PAL is used for the prodn. of L-phenylalanine from cinnamic acid and ammonia (Updated on 25-MAR-2003 to correct PR field.) (Updated on 27-AUG-2003 to correct PR field.)
                                                                                                                                                                                           Recombinant plasmid for expression of L-phenylalanine ammonia-lyase - having combined promoter of tac promoter and Pl promoter for enhanced expression.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Sequence encoding L-phenylalanine ammonia lyase (PAL) from Rhodosporidium
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       AAN81101;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             AAN81101 standard;
                                                                                                                                                                                                                                                                                                                   06-FEB-1987;
18-JUN-1987;
                                                                                                                                                                                                                                                                                                                                                         08-FEB-1988;
                                                                                                                                                                                                                                                                                                                                                                                                                                Rhodosporidium
                                                                                                                                                                                                                                                                                                                                                                                                                                                         Cinnamic acid;
                                                                                                                                                                                                                                              WPI; 1988-229543/33.
                                                                                                                                                                                                                                                                    Fukuhara N,
                                                                                                                                                                                                                                                                                                                                                                                  17-AUG-1988
                       Sequence
                                                                                                                                                                    Example; Fig 2(A)-2(D); 37pp;
                                                                                                                                                                                                                                                                                            (MITK ) MITSUI TOATSU CHEM INC.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1896
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         2136
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               2184
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        2076
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       2016
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               2064
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1956
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              2004
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1944
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             GCTCGGCGTGCAGGCGCGCGCGCGACGTGTTTGTCGGCGTGCAGCAGGAGACGATCGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CAAGATGCTCGCTTA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CAAGATGCTCGCGTA 2198
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CTCGAACGTCTCCAAGATCTACGAGGCCATCAAGTCGGGCAGGATCAACAACGTCCTCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GAGCAACGTCTCGCGCATCTACGAGGCCATCAAGGACGGCCGCATCAACCACGTCCTCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       GCCCGCGCTCTCGCCCCCGCGCACTCAGATCCTCTACGCCTTCGTCCGCGAGGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            ddccarcredereacedeceaadreedeaaaacerreddreedeedeaceredre 1955
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          GGCCATCTCGCTCACGCGCAGGTGCGCCAACCGCCTTCTGGCAGACGCCGTCTTCGCAGGC
                       2331
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    (revised)
(revised)
(first en
                                                                                                                                                                                                                                                                      Yoshino S,
                       B₽;
                                                                                                                                                                                                                                                                                                                                                                                                                                                         expression
                                                                                                                                                                                                                                                                                                                                                                                                                                toruloides
                                                                                                                                                                                                                                                                                                                     87JP-00024705.
87JP-00152357.
                                                                                                                                                                                                                                                                                                                                                        88EP-00301011
                       426 A; 888
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             DNA;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     entry)
 49
 .
51
49
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             2331
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         2150
                                                                                                                                                                                                                                                                     Sone S,
                                                                                                                                                                                                                                                                                                                                                                                                                                                         vector;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             ВР
                       ű
Score 1196.6;
                                                                                                                                                                      English
                       592
                                                                                                                                                                                                                                                                                                                                                                                                                                                         MT 10414 FerumP-8876; pYtrp6; ss
                                                                                                                                                                                                                                                                      Nakajima Y,
                       ë
                       425
                       T; 0 U; 0 Other;
 DB
                                                                                                                                                                                                                                                                      Makiguchi
1;
Length 2331;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                2123
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 2183
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        2015
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                2063
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               2003
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           2135
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         2075
```

Query Match

```
Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       묽
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ś
                                    Š
                                                                                                                      片
                                                                                                                                                                                           Ş
                                                                                                                                                                                                                                                                    뫄
                                                                                                                                                                                                                                                                                                                                             5
                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         占
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Best Local Similarity 74.0 Matches 1565; Conservative
                                            1119
                                                                                                                                                                                                   1059
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              165
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    105
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               519
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       405
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          345
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       399
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     285
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              339
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           225
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    279
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       219
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              159
                                                                                                                                                                                                                                                                                945
                                                                                                                                                                                                                                                                                                                                                              999
                                                                                                                                                                                                                                                                                                                                                                                                                                       885
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                939
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             825
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   879
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                765
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         819
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  705
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                759
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         645
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      699
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    585
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             639
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          525
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 465
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 459
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       4.
5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            99 caccacrocancena reaction de la constanta del constanta de la constanta de l
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              ATTTGGCGGATCCGCAGACACCGCACCGAGGACGCCATCTCGCTCCAGAAGGCTCTCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          GACCGACTCGACGCTCGAACTCGACGGCTACTCGCTCAACCTCGGAGACGTCGTCTCGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   CACCGACGACGTCGAGCTCAGCGGGGTACAGCCTCACCGTCGTGACGTTGTCGGCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    GCACCTGCCCACAACCCAGGTCACGCAGGTCGACATCGTCGAGAAGATGCTCGCCGCGCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         ceareccacecececaccacreersecresserics
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CGTCGCATCCGCAAAGCAGGCTGTCAATGGCGCCTCGACCAACCTCGCAGTCGCAGGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 GAACCACCGCATCACCCCATCGTCCCCCCCCCCCCGCGCTCCATCTCGGCGTCGGGGCGACCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CCTCGAGAACACGCTTCCGCTCGAGGTCGTCGCGGGGGCGCCATGGTCATCCGCGTCAACTC 578
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CGAGCACCTCTGCGGCGTGACGCCGACGTCCGYCTCGTCCTTCAGCGTCGGACGCGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CGCCCGCAAGGGCGCAGGGTCCGCGTCCAGAACGACGAGATCCGCGCACGCGCGCA
GGGCATTCTTCGCCAGGACCGCTACCCGCTCCGCACGTCGCCTCAGTTCCTCGGCCCCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        cTTGACGGCTCTCACGGTGGAGGGCCATGGTCGGCCAGGGGCTCGTTCAT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         adcarcearesceacerecretecaceacecacacarecretecerecretecacacre
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CGCCTCGATGGCGACCCTCAGTCTGCACGACGACCACATGCTCTCGCTCCTCCCCAGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CGAGCCCGTCGTCCTCGGCCCCGAAGGAAGGTCTCGGTCTCAACGGCACCGCCGTCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CGAGGCAGTCGTCCTCGGCCCGAAGGAGGGTCTCGGTCTGGTCAACGGAACGGCCGTCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CGTCCACGAGGCAAGGAGAAGATCCTGTACGCCCGGGAGGCGATGGCGCTCTTCAACCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           TTTGCACGAGGGAACCGAGAAGATCATGTTTGCGCGCGAGGCCATCTCGCTCTTTGGTCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         crerecreretación de consequencia de consequencia en consequencia de consequenc
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CAGCCCGCTCTCGTACATCGCCGGCCGCCCATCACCGGTCACCCCCGACGTCAAGGTTCACGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CAACCACGCATCACCCCATCGTCCCCCTCCGGCACCATCTCTGCGTCGGGCGACCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CTTGACCCGCGGCCACTCGGCTGTCCGCCTCGTCGTCGAGGCGCTCACCAACTTCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             TCTCGAGAACTCGCTTCCCCTCGAGGTTGTTCGCGGGGGCGCCATGACAATCCGGGGTCAACAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   CGAGCACCAGCTCTGCGGTGTTCTCCCTTCGTCGACTCGTTCCGCCTCGGCCGCGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   TTTCGGTGGCTCGGCCGACACGAGGACTGAGGATGCAGTCAGCCTCCAGAAGGCGCTCAT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CAMATCGGTCGAGTTCTTGCGCTCGCAACTCTCCATGAGCGTCTACGGCGTCACGACTGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      CAAGAGCGTCGACTTCCTCAAGGCCCAGCTTCAGAACTCGGTCTACGGAGTCACCACGGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CGCGAGGAAGGGCAGGCCTGTCCGCGTCAAGGACAGCGAGATCCGCTCAAAGATTGA
                                                                                                                                                                                       CCTTTCCGGCTCGTCGTTTGCCGTTGAGGACGAGGAGGAGGTCAAGGTCAAGGACGACGA 1118
                                                                                                                                                                                                                                                                                                                                                         CCACGACGTCTGCCGCCCGCCACCCCGGCCAGGTCGAGGTCGCGCGCAACATCCGCACGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                       GCTCACGGCCATGACGGTCGAAGCGATGGTCGGCCACGCCGGCTCGTTCCACCCCTTCCT
                                                                                                                          CCTCGAGGGAAGCCGCTTTGCTGTCCACCATGAGGAGGAGGTCAAGGTCAAGGACGACGA
                                                                                                                                                                                                                                                                                TCACGACGTCACGCGCCCTCACCCGACGCAGATCGAAGTCGCGGGAAACATCCGCAAGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  74.0%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Pred. No. 8.6e-181;
1; Mismatches 525;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      24;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             518
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               458
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             338
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               278
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      218
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                464
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      404
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             344
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   284
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      224
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            164
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               104
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                158
                                                    1178
                                                                                                                                                                                                                                                                                            1004
                                                                                                                                                                                                                                                                                                                                                                      1058
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            638
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         524
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            998
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      884
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   938
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        824
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     878
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            818
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              758
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            644
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         869
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              584
                                                                                                                                      1064
                                                                                                                                                                                                                                                                                                                                                                                                                                                   944
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               764
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     704
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      w
```

```
1896
                                                                                                                                                                                                                                                                                                                                                                                                                        1944
                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1845
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1824
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1725
                                                                                                                                                                                                                               2064
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1884
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1764
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1665
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1605
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1656
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1545
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1485
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1425
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1365
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1305
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1356
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1596
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1536
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1476
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1416
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1245
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1296
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1236
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1125
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1179
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1065
               CAAGATGCTCGCGTA
                                                                                                                   GAGCAACGTCTCGCGCATCTACGAGGCCATCAAGGACGGCCGCATCAACCACGTCCTCGT
                                                                                                                                                                                                                                                                                                         GSCCATCTCGCTCACGCGCGAGGTGCGCAACCGCTTCTGGCAGACGCCGTCTTCGCAGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CGAGGTCAAGAAGGCGCTCAACAAGCGTCTCGAGCAGGACGACGACGTACGACCTCGAGCC
                                                                             CTCGAACGTCTCCAAGATCTACGAGGCCATCAAGTCGGGCAGGATCAACAACGTCCTCCT
                                                                                                                                                                            ecrosecerecaesecececeseceaesererrercesecerecaesaeaeaeaesecea
                                                                                                                                                                                                                                                                                                                                                                       GGCCATCTCGCTCACCCGCCAAGTCCGCGAGACCTTCTGGTCCGCCGCGCCGTCGACCTCGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                           GTC--
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GCCCTCTGCCAACGTCACCCTTACTGCCGTCAACGCGTGGAAGGTTGCCTCGGCCGAGAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               GAAGGTGAACAAGACGCTCGCCAAGCGCCTCGAGCAGACCAACTCGTACGACCTCGTCCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            ccrccaecaccrcecacreeccrceacerca-----
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               GTCCAACGACGTCCTTCTCTCCTCCTCGCCACCCACCTCTACTGCGTTCTCCAAGCCAT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ececreecaceacecrrcreeraceceaceecaceercereacerccacercrerere
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 CATCGACCAGCACTTTGGCTCCGCCATGACCGGCTCGAACCTGCGCGACGAGCTCGTCGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CGACCTCCGCGCGATGGAGCTCGACTTCAAGAAGCAGTTCGACCCGCTTCTCCCGACTCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          GGCCAACGACGTCCTTTCTCCTTCTCGCCTCGCACCTGTACTGCACGCTCCAGGCCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CGACTTGCGCGCGATCGAGTTCGAGTTCAAGAAGCAGTTCGGCCCAGCCATCGTCTCGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              TGAGATGGCGAACCAGGCGGTCAACTCGCTTCGCGCTCATCTCGGCTCGTCGCACGACCGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            GÉCGTÀCACCTCGGÁGTTGGGACACCTCGCCAACCCTGTGACGACGCATGTCCAGCCGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Tecttacectricegaectceeccaectreccaacceetcactacctrectceaeccee
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CCTCGCGGCCGAAGACCCCTCGCTCCTACCACTGCAAGGGCCTCGACATCGCCGCTGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CCTCGCTGCCGAGGACCCGTCGCTCAACTATCACGGCAAGGGCTTGGACATTCACATCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        TGCCGCTGTGGCCAACACCATGGAGAGAGTCGCCTCGGGCTCGCCCAGATCGGCAAGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      GTCGGCTGTCTCGATTTCGATGGAGAAGACCAGGCTCGCACTCGCCCTCATCGGCAAGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CGACAACCCGCTCCTCGACGTCGAGAACAAGCAGCCGCGCACGGCGCAACTTCCAGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   CGTGGAGGACATGATGCACGCCTACTCGACTCTCGCTCGAGAACAACA---
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GGGCATTCTCCGCCAGGACCGCTACCCCTTGCGCACGTCTCCTCAGTGGCTCGGCCCGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CGACAACCCTCTCATCGACGTCGAGAACAAGACTTCGCACCACGGCGCCAATTTCCAGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GECACGACECCTTCTCCTTCECCGCCGGCACCGTCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                      ---GCTCTCGCTCGCCGTCAACGCCTGGAAGGTCGCCGCCGCCGAGTC
                              2198
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               ACGCACTTGCGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CGACGAC
                                                                             2135
                                                                                                                           2183
                                                                                                                                                                                                                       2123
                                                                                                                                                                                                                                                                           2015
                                                                                                                                                                                                                                                                                                                         2063
                                                                                                                                                                                                                                                                                                                                                                       1955
                                                                                                                                                                                                                                                                                                                                                                                                                        2003
                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1895
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1844
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1883
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1784
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1823
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1724
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1664
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1715
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1604
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1544
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1535
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1943
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1655
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1484
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1475
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1364
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1355
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1244
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1295
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1184
                                                                                                                                                                                                                                                                                                                                        RESULT 15
ANRIL116
ID AANR
XX AANR
AC AARR
AC AARR
AC AANR
AC AARR
AC AARR
AC AARR
AC AANR
AC AARR
AC 
Ś
                                              B
                                                                                            Ş
                                                                                                                                                  Дb
                                                                                                                                                                                        Ş
     219
```

유

В Ś 뫄 Ş В Ś B S В Ś 밁 Ş В Ś 뮍 Ş

성 음 성 음

Ъ

2150

CACCGACGACGTCGAGCTCAGCGGGTACAGCCTCACCGTCGTTGACGTTGTCGGCGC

```
Query Match

Best Local Similarity

Matches 1565; Conserv
                                                                                                                                                                                                                                                                                                       The cloned DNA from pSW13 isolated from the cloned cell carrying pSW13 was digested with various restriction endonucleases. The sequences from the fragments were analysed by the method of Maxam-Gilbert and also by biochemical means using the method of Maat. The sequences obtained were edited using the GENAS program produced by Mitsui Information Development Co. The sequence so determined is represented here. The regulation of expression of this foreign gene in E.coli carrying a recombinant plasmid comprises maintaining the culture at at least 40 deg. C. See also EP-279664. (Updated on 25-MAR-2003 to correct PR field.) (Updated on 25-MAR-2003 to correct PR field.)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          24-OCT-2003
25-MAR-2003
12-NOV-1990
                                                                                                                                                                                                                                                Sequence
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Regulation of expression maintaining temp. of cult
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Disclosure; ); 36pp;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         WPI; 1988-236895/34.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  19-FEB-1987;
18-JUN-1987;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          24-AUG-1988
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  EP279665-A.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       L-phenylalanine ammonialyase; PAL; foreign gene culture temperature; expression regulation; ss.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          (MITK ) MITSUI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                18-FEB-1988;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Rhodosporidium
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   L-phenylalanine ammonialyase structural gene
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                AAN81116;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      AAN81116 standard; DNA; 2331
                                                                                 45
                                                                                                                         99
GCACCTGCCCACAACCCAGGTCACGCAGGTCGACATCGTCGAGAAGATGCTCGCCGCGCCC
                                     cgaregccacecececaccaercgcaecrcgaearcgrecaegaecrccrcaeceaecec
                                                                                                                                                                                                                                                2331 BP; 426 A; 888 C; 592 G; 425 T; 0 U;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   z
                                                                               CGTCGCATCCGCAAAGCAGGCTGTCAATGGCGCCTCGACCAACCTCGCAGTCGCAGGCTC
                                                                                                                       CGCCGCTCCGACCAAGTCGGCTGCGGGCCCCACTTCGGCTCTCCGCCGCACGCCCGGCCT
                                                                                                                                                                   Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        (revised)
(revised)
(first entry)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Yoshino
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          TOATSU
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  87JP-00034397.
87JP-00152359.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               toruloides;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              88EP-00301356
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             /*tag=
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Location/Qualifiers
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          /product=
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    .2151
                                                                                                                                                                                  49.5%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             English
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       culture
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ŝ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CHEM INC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         0f
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Yamamoto
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               (IFO 559)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   foreign gene :
e at 40 deg. C
                                                                                                                                                                 Score 1196.6; DB 1;
Pred. No. 8.6e-181;
1; Mismatches 525;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        ВÞ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              ×
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Sone
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     in Escherichia coli -
C or more to suppress :
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              ß
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Suzuki
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           expression;
                                                                                                                                                                                                                                                0 Other;
                                                                                                                                                                                                        Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              ž
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Nakajima
                                                                                                                                                                 24;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       expression.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       γď
                                                                                                                                                                 Gaps
                                                                                                                         158
                                                                                 104
164
                                       218
```

ğ \$ B

λ

5 B 55

45 AC

		<b>р</b> р		μμ										44		ν ω	A) A)	ц
1296	1236 1185		0 1	0 0	999 945	93 93 93 93		819 765	759 705	699 645	639 585	579 · 525	19 65	0 5	9 9 9	39	279 0	L65 G
GTCG 	CGAC	CGTCA		CCTCG	CCACG	CTTGA	CGCCT	CGAGG	TTTGC	CAGCC	GAACC	GCTCA	当二日	CGAGC	TTTCG	CAAGA	4909  -  -	ACCG
	AACCC	GAGGA    AGCGA	ATTCT	ccea  - Aeee	ACGT		CGAT	CAGI	ACQ ACQ	CICI 	ACCGC	,00000 	GAGAAC	ACCAC	TOPOTE	AGCGTC	GCAAG         GGAAG	ACTCG
	CTCTC	CATG	TCGCC	CTCGT	CTGCC	TCTCA      CATGA	GGCGA	CGTCC	AGGGAACO	CTCCT	ATCA	TGGCCA	CACGCT	AGCTCTO	TCGG	GACTT	GGGCGC	ACGCT
ATTTC	CTCGA      ATCGA	ATGCA	AGGA         AGGA	CGTTTG	100001 	6-6	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	TCGGC	8-8	ACATCG		ACTCGG	TTCCG	eceec	CAGAC	CTTG	GCAGGGTO	CGAA
GATGG	CGTCG	CGCCCT.	CCGCT		CACC	TGGAGG	CAGTC	CCGAA	BAGAAGATO          BAGAAGATO	0 0 0 0 0	CCATCGT	CIG-00	CIT CO	CGTGACG	ACGAG    	AAGGC	GICCG	CTCGA
JAGAAG             JAGAAG	BAGAACI        BAGAACI	ACTO ACGO	ACCC	CGTTGAG	g-g	6 – 5 – 5	TGCACGA	AGGAGGG         AGGAAGG	77—12	529924 	TCCCC	TCCGC	AGGTCG	ဌ드	GGACT	CCCAG	0110 	ACGGCT
GACCA     GACTO	CAAGC	മ⊳	ETTGO		ggccaggr      sacgcagar	ATGGTCG	유	GGTCT	ATGTTTG	ATCAC	CHCC CHCC	CTCGTO	GIICCG	ACGTO	GAGGA 	CTCTCA	CAGAA       CAAGGA	TACTO
9607 	AGAC	TCAC	GCAC	ACGAGGAG         ATGAGGAG	<u>8</u>	GCCAC	CGCAC	မ္မော်		G	GCGGCT	8 - 3 - 3	909908 	GTTC	TGCAG	GAAC   CATG	CGACGA	GCTC
CGCAC	cecec       	GCTCG.	GTCGC	GAGG   GAGG	HAGGTCG        HAAGTCG	CAGGG  - CGCCGG	CATGCT	TCTGGT	GAGGC	CACCO	TCCAT	CTTGA	3 <u>—3</u>	GACTO		6 6 6 6	CG CG	AACCT
CTCGC	ACGG      ACGG	AGAAC     AGGCO	CTCAG	TCAF	CGCGC			CAAC	CATO	CGAC	CTCTG	90999999999999999999999999999999999999	TGGTCAT	CGTTC	걸드넘	CTACG	GATCC	CGGAG
CCTCA	CGGCA	AACA GGCC	FIGGCT	GGTCAA	CAACA      ;aaaCa	STICCA	GI C	965 	TCGCT	GTCAA      AGCAA	GCGTC	CTCAC	ATCCG	AGCGT	CAGAA	GAGT	6010 	ACGT
ATCGG	AACTTO	AGTCG	$\alpha - \alpha$	AGGAC       AGGAC	TCCGC	agccg  -  -	TCTCG	22922 		9155 		CAAC	CGTC	CGGA	11099 	CACCA	'ACGCG   'AAAGA	CGICI
CAAGC	CCAGG	ACGA	0000	g—g	ACGC      AAGC	TTCA	CAGG     CAGT	GTCT	GGTCT    AACCT	CACGI	GACCT	TTCTT	AACTC		CTCAT	ACTGG	TCGA	2992
T 135	C 129	.C 123	T 117	111	T 105	T 998	C 938	C 878	T 818	758 704	698 644	584	578	518 464	458	398	284	224
2 4	. J	70 44	00 44	00 44	œ 4 <u>.</u>													

ДĎ Ś

Дb Ş

밁 Ş 망 8 B Ş

8 밁 β Q

D, 8 Дb 8 В 8 В

Search completed: September 11, 2004, 14:50:22 Job time : 1351.06 secs

i· 

```
Result
No.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Database
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Post-processing: Minimum Match 0%
Maximum Match 100%
Listing first 45 summaries
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Run
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Minimum DB seq length: 0
Maximum DB seq length: 200000000
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Total number of hits satisfying chosen parameters:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Searched:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Scoring table:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Sequence:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Title:
Perfect score:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         DM nucleic - nucleic search, using sw model
                                                                                                                                                                                                                                                                                                                                                                                                                                                            a
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    8
              Pred. No. is the number of results predicted by chance to have a score greater than or equal to the score of the result being printed, and is derived by analysis of the total score distribution.
                                                                                                             11185
11185
11186.6
11186.6
11186.6
11186.6
11186.7
1168.6
1168.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
1108.6
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1629
1196.6
1196.6
1196.6
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Score
              US-09-939-408A-12
2419
1 ctcctgcctcactct
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  September 11, 2004, 13:38:08; Search time 181.4 Seconds (without alignments) 7400.353 Million cell updates/sec
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            4400
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                682709 seqs, 277475446 residues
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      IDENTITY_NUC Gapop 10.0 , Gapext 1.0
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Match
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Query
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 GenCore version 5.1.6 Copyright (c) 1993 - 2004 Compugen Ltd.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Length
                                           22439
22153
221651
221661
2237851
2237851
2237851
2237851
2237855
2237855
2237855
2237855
2237855
2237855
2237855
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
223785
22378
223785
223785
223785
223785
223785
223785
223785
223785
223785
2
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              DB
       US 09-252-991A-16475
US-09-252-991A-6126
US-09-489-039A-6404
US-09-615-192A-97
US-09-169-789-97
US-09-615-192A-244
US-09-615-192A-244
US-09-615-192A-244
US-08-713-000-9
US-08-713-000-9
US-08-713-000-9
US-09-615-192A-9
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                US-09-624-693A-12
US-09-624-693A-20
US-09-627-216A-9
US-09-765-673A-9
US-09-624-693A-18
US-09-627-216A-7
US-09-765-873A-31
US-09-765-873A-31
US-09-765-873A-31
US-09-765-873A-31
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 US-09-624-693A-14
US-09-615-192A-245
US-09-615-192A-247
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   SUMMARIES
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1365418
Sequence 12, Appl
Sequence 9, Appli
Sequence 9, Appli
Sequence 7, Appli
Sequence 7, Appli
Sequence 7, Appli
Sequence 31, Appl
Sequence 14, Appl
Sequence 14, Appl
Sequence 247, Appl
Sequence 247, App
Sequence 16475, App
Sequence 16475, App
Sequence 6404, App
Sequence 97, Appl
Sequence 97, Appl
Sequence 45, Appl
Sequence 45, Appl
Sequence 97, Appl
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Description
```

Ą	B &	g S	β 8 8	dg VQ	용 성	7 m O	US-		O
						Query Ma Best Loc Matches	O9-624 equence EMERAL EMERAL APPLIC APPLIC TITLE TORREN OCURREN OC		な Z A A A A A A A A A A A A A A A A A A
301 0	241 A 241 A	181 7	121 G             	61 G	0-0	tch als 2418	SULT 1 Sequence 12, Patent No. 63 Satent No. 64 Satent No.		5 5 6 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7
CGCGTCCAGAACGACGACGAGATCCGCGCACGCGCGTCGACAAGAGCGTCGACTTCCTCAA	GCGGGTA        GCGGGTA	TCGCAGCTO         TCGCAGCTO	00000000000000000000000000000000000000	CCACCAC	TCCTGCCT	milarit Conse	12 5468 MATION: OShida, KOOUSTE: ENTION: ENTION: ENTION: ENTION: INTION: ENTION: OE: 294 ICATION ICATION OF DATE O ID NO.		78866666666
GAACGAC	CAGCCTC	CGAGATO	CACTICG        CACTICG	COESTES        	2 2 2 2 3 3	100 y 100 rvative	ion Robe Archer Pher Pher Psi 120 120 120 120 120 120 120 120 120 120		11557 1563 1278 278 278 278 278 278 278 278 278 278
CGAC	ACC	9 		AAC AAC	A — A A	9,9	erta nylalani: nylalani: lynucleo lynucleo ling Same noonsc HER: US/ 1000-07-2 2.0 2.0		0 4 4 0 0 0 0 4 4 4 4 4 0 0 0 0 4 4 4 4
GAGA	GTCC	CAGGA             CAGGA	0100 0100	GGCT	CCGT	ր 	4 # # # # # # # # # # # # # # # # # # #	7	0-80 0-80 0-80 0-80 0-80 0-80 0-80 0-80
	GTGA		900900 	TTAC	CACI	red.	93A Ammoni de Sequ /624,69	AL I GNMENTS	99-1099-109-109-109-109-109-109-109-109-
CGCA	CGTT	0-0	CACG	CAAC CAAC	AGCA	241 No. matc	monia L Sequenc 4,693A	MENS	20275022000025200000
	GTCG	AGCG	8=8		ACTCG	8.6; 0; hes	ල <sup>ද</sup> ර ස	SJ	114-2 991A-11 991A-11 991A-11 10-10 116-10 710-10 710-10 710-10 710-10 710-10 991A-11 991A-11 991A-11 991A-11 991A-11 991A-11 991A-11 991A-11 991A-11
	29099 	- - - - - - - - - - - - - - - - - -		2000 4000 4000 4000 4000 4000 4000 4000	6 <u>-6</u>	0	and and		6 2 412
CAA	)     	CACC	TCGAT	0 0 0 0 0 0 0	TGGCC	, 4, H	olyp olyp		4.00 Ú
	6-6 6-6	GA GA	Teeco	CGCTC	11000011 	Lengt	họ c c c c c c c c c c c c c c c c c c c		
III G	AAGGG	GACGIO	CACGC	G=G	1001	19th	O e		seque seq seque seq seq seq seq seq seq seq seq seq se
ACTT	36060 		6 <u>—</u> 6	CCAA	TTGGACT	241	Obta		onence control of the control of the
	CAGGG	CGAGCT	GCACCA	CAAGTCGGCT	ନ୍ଦ୍ର=ନ	9; Gaj	nining		22 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4
 	010 010 010 010	0 0 1 0 1 0	െ	7-7	검프검	a A			124 App 1 178
360	300	240 240	180 180	120 120	60	0	and		444444444444444

DB 1411 ANCHAPCAGGCAMGGCTTGAGACTTCAGCTTCAGGCTTCAGGACTCGAGGACTCGAGGACTCAGGACTTCGAGGACTTCGAGGACTCAGGACTCGAGGACTCAGGACTCAGGACTTCAGGACTAGGACTCAGGACTAGGACTCAGGACTAGACTCAGGACTAGACAGAC	381 CTCAACGCTGCCATGAACCGCGGCCTGCCTTCGTGCCTCGCTGCCGAGGACCCGTCGCTC 1440	GAGTTG 13       GAGTTG 13	261 AACAAGCAGACCGCGCACGGCGGCAACTTCCAGGCGTCGGCTGTCTCGATTTCGATGGAG 1320	201 TACTTOGACTCTCTCGCTCGAGAACAACACGACGACCGACGACCGCTCCTCGACGTCGAG 1260	سر سر	0-0	1021 CCCGGCCAGGTCGAGGTCGCGCGCAACATCCGCACGCTCCTTTCCGGCTCGTCGTTTGCC 1080	961 GCCATGGTCGGCCAGCAGGGCTCGTTCGCGGCGGTTCATCCACGACGTCTGCCGCCCGC	901 CTGCACGACTCGCACATGCTCTCGCTCCTCGCAGGCCTTGACGGCTCTCACGGTGGAG 960 901 CTGCACGACTCGCACATGCTCTCGCTCCTCGCAGGCCTTGACGGCTCTCACGGTGGAG 960	841 AAGGAGGTCTCGGTCTAACGGAACGGCCGTCTCCGCCTCGATGGCGACCCTCAGT 900	781 ATCATGTTTGGGCGCGAGGCCATCTCGCTCTTTGGTCTCGAGGGCAGTCGTCGTCGGCCCG 840 [	721 GECGCCATCACCGGTCACCCCGACGTCAAGGTTCACGTTTTGCACGAGGAACCGAGAAC 780	661 GTCCCCTCGCGCGGCTCCATCTCGGCGTCGAGCCTCAGCCCGCTCTCGTACATCGCC 720 [	601 GTCCGCCTCGTCGTTCATGAGGCGCTCACCAACTTCTTGAACCACCGCATCACGCCCATC 660	541 GAGGTCGTCGCGGCGCCATGGTCATCCGCGTCAACTCGCTCACGCGTGGCCACTCGGCC 600 541 GAGGTCGTCGCGCGCCATGGTCATCCGCGTCAACTCGCTCACGCGTGGCCACTCGGCC 600	481 ACGCCGACGICCGYCICGICCTTCAGCGICGGACGCGGCCTCGAGAACACGCGTTCCGCTC 540	421 AGGACTGAGGATGCAGTCAGCCTCCAGAAGGCGCTCATCGAGCACCTCTGCGGCGTG 480	301 GGCGTCCAGAACGACGACGAGATCCGCGCACGCGTCGACAAGAGCGTCGACTTCCTCAAG 360 361 GCCCAGCTTCAGAACTCGGTCTACGGAGTCACCACGGGTTTCGGTGGCTCGGCCGACACG 420 1
561 561 561 561 662 662 662 662 662 663 663 663	US ;	ور م	-da -ko	DE QY	ь 8		P 0	ā õ	B 8	<u> </u>	<u> </u>	ā ŏ	<u> </u>	ס ט	<u> </u>	- b 0	) U (	O B O
ACTRICCAACCCGGTCAACGCTTGACATTCGACATCGCTGCTTACCTTTGCCAACCCGGTCAACCCGGTCACCTTTGGTCCAGCCGCAGAGATTCCATCGCTACCTTTGTTCCAACGCCGCAGAGATTCCATCCCAACCCCGAGAGATTCCACCCCAACCCCGCAGAGATTCCACCCCAACCCCGCAGAGATTCCACCCCAACCCCGCACCCACACCCTTCTTCCCCAACCCCCAACCCCTTCTTCCCCAACCCTTCCACCCCAACCCCTTCTT	93A-	2401 . 2401 .	2341	2281 2281	2221 2221	2161 2161	2101 2101	2041	1981 1981	1921 1921	1861 1861	1801	1741 1741	1681 1681	1621 1621	1561	1501	1441
AGGGCTTGGACATTCACATCGCGCAAAGGCCTTCCTCCAGGCCGCAAGGCCTTCGTCCAGGCCGCAAGGCCTTCGTCCAGGCCGCAAGGCCTTCTCGCGCGCG	20 Application	GTTCAA        GTTCAA	190900 	CTCCATACACATG               CTCCATACACATG	BACGCCCGCCTCAC	GGCGCATCAACCA             GGCGCATCAACCA	GGCGTGCAGCAGGA             GGCGTGCAGCAGGA	CTGTACTCGTTCGT             CTGTACTCGTTCGT	TGGCAGACGCCGTC	TGGAAGGTTGCCTC	GTCGTCGAGCTCCT	94-94	CTCGACGTCAACGC	TTCAAGAAGCAGTI           TTCAAGAAGCAGTI	CTCGCCTCGCACCI	TOGOTOGOTOTOAS	CTTGCCAACCCGG	AACTATCACGGCAA
TCACATCGCTGCTAGAGATGCCTTTAGCAGAGCCGGAGAGATGCCTGCAGAGCCTGCAGAGAGATGCCTGCAGAGAGATGCCTGCC	/096246	AAAAA 2419       AAAAA 2419	TCGTCAGTACACG	TCGCCTTACTCTC           TCGCCTTACTCTC	CCCAAGACCAGCT	CGTCCTCGTCAAC	GACGATCGGGAGG	GCGCGAGGAGCTO	TTCGCAGGCGCCC	GGCCGAGAAGGC           GGCCGAGAAGGC	CTCGTCCTCGCC	ACCTCGAGCCGCGG	CACTTGCGCTCGA             CACTTGCGCTCGA	rcgacccgcttct           rcgacccgcttct	TGTACTGCACGCT	TCTCCGCGCGCGCGG	TCACTACCTICGT	agggcttggacat            agggcttggacat
341-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-			TGTATAGAGCCT	TCGCCGTCATCA	TTTCGACGTCGT           TTTCGACGTCGT	ATGCTCGCGTAA            ;ATGCTCGCGTAA	AACGTCTCGCGC            AACGTCTCGCGC	GGCGTGCAGGCG	GCGCACGCATAC	DATCTCGCTCACG	CTCTGCCAACGTC	CTGGCACGACGCC	GGTCAAGAAGGCG              GGTCAAGAAGGCG	CCGACTCTCCTC	CCAGGCCGTCGA(             CCAGGCCGTCGA(	CACTGCCGAGGCC	CCAGCCCGCAGAC	TCACATCGCTGC
Gectifical Gectification Gectification Gectification Gectification Gectification Gettification Getti			GGAATGGATTGC           GGAATGGATTGC	CGTCTCTCAGTT	GTCGTGCCAAGA	.GGCCCGAGCAAG 	ATCTACGAGGCC	;ceccgcgcgac              :accgcggcgac	CTCTCGCCGCGCCCCCCCCCCCCCCCCCCCCCCCCCCC	CGCGAGGTGCGC	ACCCTTACTGCC	TTCTCGTACGCC	CTCAACAAGCGI             CTCAACAAGCGI	CCAGCAGCACCTO	CTTCCGCGCGATO	CAACGACGTCCT	GATGGGCAACCA            GATGGGCAACCA	TTACGCTTCGGA           TTACGCTTCGGA
					N N	D D				വ—വ	<b>₽</b> —•	р р	مر سر	υυ				

Ś

Ş 뮍 103 망 g Ş B Ş Ъ 8 В Ś В Ś P B Ś

뮍 80 g Ş 멍 Ş В Ş 멍 Ş В Ş

-09-624-633A-20  Gery Match  For 18.0%; Pred. No. 7.38-307;  Bast Local Similarity 78.0%; Pred. No. 7.38-307;  Matches 1878; Conservative 1; Mismatches 504; Indels 25; Gaps 8;  Matches 1878; Conservative 1; Mismatches 504; Indels 25; Gaps 8;  ATGGCCCCTCCTCCTCGACTCGACTCGCACCCCACCGCCCACCGCCACCGCTTCGCCGCGCACGCCTCGACCGCTCGACCTCCTCCTCCCCCCCC	Patent No. 6355468  GENERAL INFORMATION: APPLICANT: Yoshida, Roberta APPLICANT: Yoshida, Roberta APPLICANT: Yoshida, Roberta APPLICANT: Koshida, Roberta TITLE OF INVENTION: Phenylalanine Ammonia Lyase Polypeptide and TITLE OF INVENTION: Polynucleotide Sequences and Methods of Obtaining and TITLE OF INVENTION: Using Same FILE REFERENCE: 23479/500NSC CURRENT FILING DATE: 2000-07-24 UNMBER OF SEQ ID NOS: 25 SOFTWARE: Patentin Ver. 2.0 LENGTH: 2475 TYPE: DNA CRGANISM: Artificial Sequence FEATURE: NAME/KEY: misc difference FEATURE: INFORMATION: n = A or C or G or T; "n" indicates no consensus at that position OTHER INFORMATION: Description of Artificial Sequence: Consensus Patent No. 6355468 Patent No. 6355468
97 10 98 10 99 11 99 11 99 11 99 11 99 11 10 99 11 11 11 11 11 11 11 11 11 11 11 11 11	Qy 61 Qy 71 Qy 81 Qy 88 Qy 88 Qy 88 Qy 88 Qy 99 Qy 99
1051 CGCACGCTCCTTTTCCGGCTCGTTTGCCGTTGAGCACGAGGAGGAGGAGGAGGAGGAGGTCAAGGTCAAG 1110	691 GGCGACCTCAGCCCGCTCTCGTACATCGCCGGCGCATCACCCCGACCGA

```
US-09-627-216A-9

S-GUENCE 9, Application US/09627216A

Patent No. 6368837

GENERAL INFORMATION:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    뫄
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             g,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ъ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      뭕
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       D,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  멍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   よ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ś
                                                                                                                                           APPLICANT: Vannelli, Todd
APPLICANT: Gatenby, Anthony
TITLE OF INVENTION: Bioproduction of para-Hydroxycinnamic
FILE REFERENCE: BC1009 US NA
CURRENT ETLING DATE: 2000-07-27
PRIOR APPLICATION NUMBER: 60/147,719
PRIOR APPLICATION NUMBER: 60/147,719
PRIOR FILING DATE: 1999-08-06
NUMBER OF SEQ ID NOS: 14
SOFTWARE: Microsoft Office 97
SEQ ID NO 9
                                                                                                                                                                                                                                                                                                                                                                                                                 APPLICANT: Sariaslani, Sima
APPLICANT: Tang, Xiao-Song
APPLICANT: Qi, Wei Wei
       OTHER INFORMATION: OTHER INFORMATION:
                                                                         TYPE: DNA ORGANISM: Artificial Sequence
                                                       FEATURE:
                                                                                                                              LENGTH: 2151
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               2401
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      2281
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    2293
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 2221
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               2161
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             2174
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                2101
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  2233
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             2114
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              2041
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         2054
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1981
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1994
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1921
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1934
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1861
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1876
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1801
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1741
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1816
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             NNNANAAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        AAAAAAA 2419
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GGTCGTCA-GTACACGTGTATAGAGCCTGGAATGGATTGCAAGTCTTCGAGTTCAAAAAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            NNICCNININININCTITTINGININTCGINTCHTGNCHININICGGAINTHINCHININININ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   NGTNNNCANNNACNCNTNNNNNNANNCNGGNANNGANTNNANGNNTNCGNGNNCNNNNNN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              THINNINGNTHINGTONGTONGNANGNIGTCHNTHINNINGTHINGHNTHINNINNINGNINNC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            TGTCGCCTTACTCTCGCCGTCATCACGTCTCTCAGTTCTTTCGTATCCCGCGTCTCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          ACCCCAAGACCAGCTTTTCGACGTCGTGTCGTGCCAAGAACGGACTTTCCTCCATACACA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             ACGTCCTCGTCAAGATGCTCGCNTAGNNNCNCNNNCNANNCTCGCNTNNNNNCCNNNCNC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          ACGTCCTCGTCAAGATGCTCGCGTA-AGGCCCGAGCAAGCCTCGCCTAGACGCCCGCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        TGACGATCGGCACCAACGTCTCCCGCATCTACGAGGCCATCAAGNNCGGCNGCATCAACC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              AGACGATCGGGAGCAACGTCTCGCGCATCTACGAGGCCATCAAGGACGGCCGCATCAACC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      TCCGCGAGGAGCTCGGCGTCAAGGCCCGCCGCGACGTCTTCCTCGGCAAGCAGGAGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       TGCGCGAGGAGCTCGGCGTGCAGGCGCGCGCGGCGACGTGTTTGTCGGCGTGCAGCAGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CTTCGCAGGCGCCGGCGCACGCATACCTCTCCGCCGCGCACGCCGCGCGCTCCTGTACTCGTTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             NNGTCCTCGCCNNNNGCCANNAGGTCTCGCTCGCNGCCGTCAACGCCTGGAAGGTCGCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         TCGTCCTCGCCCTCTGCCA--ACGTCACCCTTACTGCCGTCAACGCGTGGAAGGTTGCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      CTCGAGCCGCGCTGGCACGACGCCTTCTCGTACGCGACCGGCACCGTCGTCGAGCTCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CTCGNGGACAAGGTCAACAAGNCGCTCNACAAGCGNCTCGAGCAGCAGCCAACTCGTACGAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    cercercercecedes renderables related es de ceces de la recherce de la cerce de
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             CCGCCGAGAAGGCCATCTCGCTCACGCGCNANGTCCGCGACNCCTTCTGGNCGGCNCCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          ceecceaeaaeeccarcreecreaeeeceaeerececaaececrrereecaeaeecer
  Description of Artificial Rhodotorula glutinis
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          2408
                                                                                                                                                                                                                                                                                                                                                                                                                                                              rrj
                           Sequence:
                                                                                                                                                                                                                                                                                                                                         Acid
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   2400
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 2411
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          2292
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          2220
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        2232
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        2160
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   2173
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1993
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1860
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      2100
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 2113
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 2040
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  2053
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1920
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1933
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1980
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1800
                                5
                                                                                             밁
                                                                                                                                   Š
                                                                                                                                                                                           맑
                                                                                                                                                                                                                            5
                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                          8
                                                                                                                                                                                                                                                                                                                                                                                  ğ
                                                                                                                                                                                                                                                                                                                                                                                                                           Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           맑
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Вþ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         δÃ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              맑
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      맑
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ϋ́
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             US-09-627-216A-9
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Query Match
Best Local Similarity
Matches 1565; Conserv
                                                                                             945
                                                                                                                                                                                                                                                                                         825
                                                                                                                                                                                                                                                                                                                                       879
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         585
                                                                                                                                                                                                                                                                                                                                                                                     765
                                                                                                                                                                                                                                                                                                                                                                                                                                819
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                705
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              759
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              645
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            699
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       639
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     525
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  579
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   465
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 405
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                519
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              459
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              345
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            399
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            285
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          339
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          225
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        279
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      165
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      219
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      105
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 159
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  45
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  99
                                                                                                                       CCACGACGTCTGCCGCCCGCACCCCGGCCAGGTCGAGGTCGCGCGCAACATCCGCACGCT
CCTCGAGGGAAGCCGCTTTGCTGTCCACCATGAGGAGGAGGTCAAGGTCAAGGACGACGA
                                           CCTTTCCGGCTCGTTGCCGTTGAGCACGAGGAGGAGGTCAAGGTCAAGGACGACGA
                                                                                             TCACGACGTCACGCCCTCACCCGACGCAGATCGAAGTCGCGGGAAACATCCGCAAGCT
                                                                                                                                                                                         GCTCACGGCCATGACGGTCGAAGCGATGGTCGGCCACGCCTGGTTCCACCCCTTCCT
                                                                                                                                                                                                                                    CTTGACGGCTCTCACGGTGGAGGCCATGGTCGGCCAGCAGGGCTCGTTCGCGCCGTTCAT
                                                                                                                                                                                                                                                                                                                     CGCCTCGATGGCGACCCTCAGTCTGCACGACTCGCACATGCTCTCGCTCCTCTCGCAGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                AGCATCGATGGCCACCCTCGCTCTGCACGACGCACACATGCTCTCGCTCTCTCGCAGTC
                                                                                                                                                                                                                                                                                                                                                                             CGAGCCCGTCGTCCGCCCGAAGGAGGGTCTCGGTCTCGTCAACGGCACCGCCGTCTC
                                                                                                                                                                                                                                                                                                                                                                                                                 CGAGGCAGTCGTCCTCGGCCCGAAGGAGGGTCTCGGTCTGGTCAACGGAACGGCCGTCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                             CGTCCACGAGGGCAAGGAGATCCTGTACGCCCGCGAGGCGATGGCGCTCTTCAACCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           TTTGCACGAGGGAACCGAGAAGATCATGTTTGCGCGCGAGGCCATCTCGCTCTTTGGTCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CTCTCCTCTCCTACATTGCAGCGGCCATCAGCGGTCACCCGGACAGCAAGGTGCACGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               CAGCCCGCTCTCGTACATCGCCGGCGCCATCACCGGTCACCCCGACGTCAAGGTTCACGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CAACCACGGCATCACCCCATCGTCCCCCCTCCGCGCACCATCTCTGCGTCGGGCGACCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GAACCACCGCATCACGCCCATCGTCCCCCCCCCCCCCCATCTCCATCTCCCGCCTCCGACCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 CCTCGAGAACACGCTTCCGCTCGAGGTCCTCCGCGGCGCCATGGTCATCCGCGTCAACTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CGAGCACCAGCTCTGCGGTGTTCTCCCTTCGTCGTTCGACTCGTTCCGCCTCGGCCGCGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CGAGCACCAGCTCTGCGGCGTGACGCCGACGTCCGYCTCGTCCTTCAGCGTCGGACGCGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            ATTTGGCGGATCCGCAGACACCCGCACCGAGGCCCATCTCGCTCCAGAAGGCTCTCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 GCACCTGCCCACAACCCAGGTCACGCAGGTCGACATCGTCGAGAAGATGCTCGCCGCGCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                TCTCGAGAACTCGCTTCCCCTCGAGGTTGTTCGCGGCGCCATGACAATCCGCGTCAACAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             TTTCGGTGGCTCGGCCGACACGAGGACTGAGGATGCAGTCAGCCCTCCAGAAGGCCGTCAT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CAAATCGGTCGAGTTCTTGCGCTCGCAACTCTCCATGAGCGTCTACGGCGTCACGACTGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CAAGAGCGTCGACTTCCTCAAGGCCCCAGCTTCAGAACTCGGTCTACGGAGTCACCACGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CGCCCGCAAGGGGCGAGAGGGCGCGCGCGCGAGACGAGATCCGCGCGACGACGACGAGATCGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   GACCGACTCGACGCTCGAACTCGACGGCTACTCGCTCAACCTCGGAGACGTCGTCTCGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               CACCGACGACGTCGTCGAGCTCAGCGGGTACAGCCTCACCGTCGGTGACGTTGTCGGCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CGCGAGGAAGGCAGGCCTGTCCGCGTCAAGGACAGCGACGAGATCCGCTCAAAGATTGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CGATGGCCACGCGCGCACCAGTCGCAGCTCGAGATCGTGCAGGAGCTCCTCAGCGACCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               CGTCGCATCCGCAAAGCAGGCTGTCAATGGCGCCTCGACCAACCTCGCAGTCGCAGGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CGCCGCTCCGACCAAGTCGGCTGCGGGGCCCACTTCGGCTCTCCGCCGCACGCCCGGCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    49.5%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Score 1196.6; DB 4;
Pred. No. 3.8e-223;
1; Mismatches 525;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           2151
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             24;
```

698 644 758

704

638

458 404 518 518 578 578 398

104 218 164 278 278 224 338

344

584

22 22 23 23

8 8 8

밁

```
1656
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1485
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1425
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1365
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1416
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1305
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1356
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1245
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1296
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1185
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1125
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1179
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1119
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1785
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1824
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1725
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1764
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1665
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1605
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1545
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1596
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1536
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1476
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1236
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1896
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1944
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1845
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1884
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               GTCGGCTGTCTCGATTCGATGGAGAGAGACCAGGCTCGCACTCGCCCTCATCGGCAAGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     ĠĠĠĊĂŤŤĊŤĊĊĠĊĊĂĠĠĂĊĊĠĊŤĂĊĊĊĊŤŤĠĊĠĊĂĊĠŤĊŦĊĊŤĊĂĠŤĠĠĊŤĊĠĠĊĊĊĠĊŢ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 GGGCATTCTTCGCCAGGACCGCTACCCGCTCCGCACGTCGCCTCAGTTCCTCGGCCCGCT 1178
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             CCTCGCTGCCGAGGACCCGTCGCCTCAACTATCACGGCAAGGGCTTGGACATTCACATCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      CAACTTCACGCAGCTCACCGAGATGCTCAACGCCGGCATGAACCGCGGGCCTCCCCTCCTG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  TGCCGCTGTGGCCAACACCATGGAGAAGACTCGCCTCGGGCTCGCCCAGATCGGCAAGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   CGACAACCCTCTCATCGACGTCGAGAACAAGACTTCGCACCACGGCGGCAATTTCCAGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  свасалсссветселселсваванасального свесовение спостовного свясального свясальног
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 CGAGGTCAAGAAGGCGCTCAACAAGCGTCTCGAGCAGACGACGACGTACGACCTCGAGCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GGCCAACGACGTCCTTTCTCTCCTCTCCTCGCACCTGTACTGCACGCTCCAGGCCGT 1655
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     TGAGATGGCGAACCAGGCGGTCAACTCGCTTGCGCTCATCTCGGCTCGTCGCACGACCGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       AGAGATGGGCAACCAGGCCGTCAACTCGCTCGCTCTCATCTCCGCCGCCGCCGCACTGCCGA 1595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GGCGTACACCTCGGAGTTGGGACACCTCGCCAACCCTGTGACGACGCATGTCCAGCCGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 GCGCTGGCACGACGCCTTCTCGTACGCGACCGGCACCGTCGTCGAGCTCCTCCTCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CCTCCAGCAGCACCTCGGCACTGGCCTCGACGTCA------ACGCACTTGCGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   свасстссвоевалевавстсвасттсвавававсавттевассвесттстсссвастст
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       GTCCAACGACGTCCTTTCTCTCCTCCTCGCCACCCACCTCTACTGCGTTCTCCCAAGCCAT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              recriacecricegaecroseccaecrisecaaccesercaecraecriceaeccese
CTCGAACGTCTCCAAGATCTACGAGGCCATCAAGTCGGGCAGGATCAACGACGTCCTCCT
                                                                                          GAGCAACGTCTCGCGCATCTACGAGGCCATCAAGGACGGCCGCATCAACCACGTCCTCGT
                                                                                                                                                                                                                                                     GCTCGGCCTGCAGGCGCCGCCGCGGCGACCTTTTTCTCGGCCGTCCAGCAGCAGGAGACGATCGG
                                                                                                                                                                                                                                                                                                                                                                             decedecerered hacereredeceded acreasare erenaede erredeceded a deceded a dec
                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GGCCATCTCGCTCACCCGCCAAGTCCGCGAGACCTTCTGGTCCGCCGCGTCGACCTCGTC 1955
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GGCCATCTCGCTCACGCGAGGTGCGCAACCGCTTCTGGCAGACGCCGTCTTCGCAGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          GTC-----GCTCTCGCTCGCCGCCGTCAACGCCTGGAAGGTCGCCGCCGCCGAGTC 1895
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GCGCTGGCACGACGCCTTCTCCTTCGCCGCCGGCACCGTCGTCGAGGTCCTCTCGTCGAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            GAAGGTGAACAAGACGCTCGCCAAGCGCCTCGAGCAGACCAACTCGTACGACCTCGTCCCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CATCGACCAGCACTTTGGCTCCGCCATGACCGGCTCGAACCTGCGCGACGAGCTCGTCGA 1724
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   CGACTTGCGCGCGACCGAGTTCGAGTTCAAGAAGCAGTTCGGCCCAGCCATCGTCTCGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  ceregegecegaagaececeregerereciaecaerecaaerecaaeaeaeceregecegerec
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1883
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1784
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1823
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1763
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1664
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1715
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1544
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1484
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1535
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1424
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1475
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1364
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1415
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1304
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1355
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1244
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1295
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1184
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1235
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1124
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1604
                                                                                                                                                                                                                                                                                                                                                                                            2015
     2135
                                                                                                    2183
                                                                                                                                                                                                                                                                                        2123
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      2063
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               2003
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ş.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ś
                                                                                                                                                                                                                                                                                                                                                                                                                          δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                              8
                                                                                                                                                 밁
                                                                                                                                                                                                                                      S
                                                                                                                                                                                                                                                                                                                                               밁
```

Ş

8 8 8 8 8

```
CURRENT APPLICATION NUMBER: US/09/765,873A
CURRENT FILING DATE: 2001-01-19
PRIOR APPLICATION NUMBER: US 09/627,216
PRIOR FILING DATE: 2000-07-27
PRIOR APPLICATION NUMBER: US 60/147,719
PRIOR FILING DATE: 1999-08-06
NUMBER OF SEQ ID NOS: 38
SOFTWARE: Microsoft Office 97
SEQ ID NO 9
LENGTH: 2151
TYPE: DNA
ORGANISM: mutant from Rhodotorula glutinis
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           RESULT 4
US-09-765-873A-9
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              ; NAME/KEY: CDS
; LOCATION: (1)..(2151)
US-09-765-873A-9
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Sequence 9, Application US/09765873A Patent No. 6521748 GENERAL INFORMATION:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Query Match
Best Local Similarity
Matches 1565; Conserv
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       APPLICANT: Tang, Xiao-Song
TITLE OF INVENTION: BIOPRODUCTION OF PARA-HYDROXYCINNAMIC ACID
FILE REFERENCE: BC1009 US CIP
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          FEATURE:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         2184 CAAGATGCTCGCGTA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          2136 CAAGATGCTCGCTTA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         165
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          225
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                279
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           219
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              159
   585
                                                                                                                                                                                                                                                                                                  465
                                                                                                                                                                                                                                                                                                                                                                   519
                                                                                                                                                                                                                                                                                                                                                                                                                                                 405
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      459
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            345
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     399
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               285
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 339
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       <u>4</u>5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            ATTTGGCGGATCCGCAGACACCGGCACCGAGGACGCCATCTCGCTCCAGAAGGCTCTCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GACCGACTCGACGCTCGAACTCGACGGCTACTCGCTCAACCTCGGAGACGTCGTCTCGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CACCGACGACGTCGTCGAGCTCAGCGGGTACAGCCTCACCGTCACGTGACGTTCTCGGCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    GCACCTGCCCACAACCCAGGTCACGCAGGTCGACATCGTCGAGAAGATGCTCGCCGCGCCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      CGTCGCATCCGCAAAGCAGGCTGTCAATGGCGCCTCGACCAACCTCGCAGTCGCAGGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CAAATCGGTCGAGTTCTTGCGCTCGCAACTCTCCATGAGCGTCTACGGCGTCACGACTGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        cecceapaeeececaceariceecarceaeaaceaceaeaaceaeceaececececeae
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             CGCCGCTCCGACCAAGTCGGCTGCGGGCCCCACTTCGGCTCTCCGCCGCACGCCCCGGCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  тттсдетесстсеессеясясваевастеледатеслетслесстсследлеесстсят
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 CAAGAGCGTCGACTTCCTCAAGGCCCCAGCTTCAGAACTCGGTCTACGGAGTCACCACGGG 398
CAACCACGGCATCACCCCATCGTCCCCCTCCGCGGCACCATCTCTGCGTCGGGCAAC
                                          GAACCACCGCATCACGCCCATCGCCCCCCCGCGGCTCCATCTCGGCGTCGGGCGACCT
                                                                                                                                                                                                         GCTCACGCGTGGCCACCACCGTCCGTCCTTCAGGGCGCTCACCACCAACTTCTT
                                                                                                                                                                                                                                                                                              TCTCGAGAACTCGCCTTCGCCGCGAGGTTGTTCGCGGCGCCATGACAATCCGCGTCAACAG
                                                                                                                                                                                                                                                                                                                                                            CCTCGAGAACACGCTTCCGCTCGAGGTCGTCCGCGGCGCCATGGTCATCCGCGTCAACTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CGCGAGGAAGGGCAGGCCTGTCCGCGTCAAGGACAGCGACGAGATCCGCTCAAAGATTGA
                                                                                                                                                  criteáccedeceácticedecretecedecretecenedadecedecidadeaactrecen
                                                                                                                                                                                                                                                                                                                                                                                                                                             CGAGCACCAGCTCTGCGGTGTTCTCCCTTCGTCGTTCGACTCGTTCCGCCTCGGCCGCGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  ceaecaccaectrores en accesos en construction de la construcción de la 
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         49.5%;
74.0%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  2150
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    2198
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Score 1196.6; DB 4;
Pred. No. 3.8e-223;
1; Mismatches 525;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     glutinis
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        2151
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          24;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 458
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               104
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         158
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           344
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               338
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                164
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      218
                                                                                                                                                                                                                                                                                                                                                                                   578
                                                                                                                                                                                                                                                                                                                                                                                                                                                            464
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  518
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           404
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      284
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     224
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          278
               644
                                                                                        698
                                                                                                                                                                                                                                    638
                                                                                                                                                                                                                                                                                                             524
```

```
1545
                                                                                                                                                                                                                                                                     1596
                                                                                                                                                                                                                                                                                                                             1485
                                                                                                                                                                                                                                                                                                                                                                                                                                  1425
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1476
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1365
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1416
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1305
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1245
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1296
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1185
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1125
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1179
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1236
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1065
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1119
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1005
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1059
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         945
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           999
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 885
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                939
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         825
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                819
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           879
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              765
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        705
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             645
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GCTCACGGCCATGACGGTCGAAGCGATGGTCGGCCACGCCGGCTCGTTCCACCCCTTCCT
CATCGACCAGCACTTTGGCTCCGCCATGACCGGCTCGAACCTGCGCGACGAGCTCGTCGA 1724
                                          CCTCCAGCAGCACCTCGGCACTGGCCTCGACGTCA------ACGCACTTGCGCT
                                                                                                                                                                                                          GTCCAACGACGTCCTTCTCTCCTCCTCGCCACCCACCTCTACTGCGTTCTCCAAGCCAT
                                                                                                                                                                                                                                                       GGCCAACGACGTCCTTTCTCCTTCTCGCCCTCGCACCTGTACTGCACGCTCCAGGCCGT
                                                                                                                                                                                                                                                                                                                                                      AGAGATGGGCAACCAGGCCGTCAACTCGCTCGCTCTCATCTCCGCGCGCCCCCCACTGCCGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   CCTCGCTGCCGAGGACCCGTCGCTCAACTATCACGGAAGGGCTTGGACATTCACATCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CGACTTGCGCGACCGAGTTCGAGTTCAAGAAGCAGTTCGGCCCAGCCATCGTCTCGCT
                                                                                                                                      CGACCTCCGCGCGATGGAGCTCGACTTCAAGAAGCAGTTCGACCGCCTTCTCCCGACTCT
                                                                                                                                                                                                                                                                                                                    TGAGATGGCGAACCAGGCGGTCAACTCGCTTGCGCTCATCTCGGCTCGTCGCACGACCGA
                                                                                                                                                                                                                                                                                                                                                                                                                         GGCGTĂCACCTCGGAGTTGGGACACCTCGCCĂACCCTGTGACGACGCATGTCCAGCCGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                           ceresesses and acceptace actions and acceptace 
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              TGCCGCTGTGGCCAACACCATGGAGAAGACTCGCCTCGGGCTCGCCCAGATCGGCAAGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           GTCGGCTGTCTCGATTCGATGGAGAAGACCAGGCTCGCACTCGCCCTCATCGGCAAGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      CGACAACCCGCTCCTCGACGTCGAGAACAAGCAGACCGCGCGACGGCGGCAACTTCCAGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   TCACGACGTCACGCGCCTCACCCGACGCAGATCGAAGTCGCGGGAAACATCCGCAAGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CCACGACGTCTGCCGCCCGCACCCCGGCCAGGTCGAGGTCGGGCGCAACATCCGCACGCT 1058
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      CGACAACCCTCTCATCGACGTCGAGAACAAGACTTCGCACCACGGCGGCAATTTCCAGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CGTGGAGGACATGATGCACGCCTACTCGACTCTCGCGTCGAGAACAACA---CGACGAC 1235
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   GGCATTCTCCGCCAGGACCGCTACCCCTTGCGCACGTCTCCTCAGTGGCTCGGCCCGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GGGCATTCTTCGCCAGGACGGCTACCCGCTCCGCACGTCGCCTCAGTTCCTCGGCCCGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              ccicgagggaagccgciriigcigiccaccargaggaggaggicaaggicaaggacgacga
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CCTTTCCGGCTCGTCGTTGCCGTTGAGGACGAGGAGGAGGTCAAGGTCAAGGACGACGA 1118
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CTTGACGGCTCTCACGGTGGAGGCCATGGTCGGCCAGCAGGCTCGTTCGCGCCCGTTCAT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                AGCATCGATGGCCACCCTCGCTCTGCACGCCACACACATGCTCTCGCTCTCGCAGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CGCCTCGATGGCGACCCTCAGTCTGCACGACACGCCACATGCTCTCGCTCTCGCACGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CGAGCCCGTCGTCCTCGGCCCGAAGGAGGGTCTCGGTCTCAACGGCACCGCCGTCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CGAGGCAGTCGTCCTCGGCCCGAAGGAGGGTCTCGGTCTGGTCAACGGAACGGCCGTCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CGTCCACGAGGCAAGGAGGAGGATCCTGTACGCCCGCGAGGCGATGGCGCTCTTCAACCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          TTTGCACGAGGGAACCGAGAAGATCATGTTTGCGCGCGAGGCCATCTCGCTCTTTGGTCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     crerecrerenda ingea gege carea gege en cace es acade a cacer en cacer
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 CAGCCCGCTCTCGTACATCGCCGGCGCCATCACCGGTCACCCCGACGTCAAGGTTCACGT
                                                  1763
                                                                                                       1664
                                                                                                                                                                                                               1604
                                                                                                                                                                                                                                                                  1655
                                                                                                                                                                                                                                                                                                                    1544
                                                                                                                                                                                                                                                                                                                                                                       1595
                                                                                                                                                                                                                                                                                                                                                                                                                         1484
                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1535
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1424
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1475
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1364
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1415
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1304
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1355
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1295
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1244
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1178
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1184
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1124
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1064
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1004
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        944
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           998
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                884
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   938
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        824
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           878
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  818
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        704
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          758
뭕
                                 5
                                                                                                  맑
                                                                                                                                                  Ś
                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                       S
                                                                                                                                                                                                                                                                                                                                                                                                                         US-09-624-693A-18
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  RESULT 5
US-09-624-693A-18
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                            Query Match
Best Local S
Matches 1565
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       2124
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               2064
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1956
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    2004
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1896
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1845
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1884
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1785
                                               219
165
                                                                                                     105
                                                                                                                                                       159
                                                                                                                                                                                                            45
                                                                                                                                                                                                                                                            99
```

```
Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1764
CAAGATGCTCGCGTA 2198
                                                                                                      GAGCAACGTCTCGCGCATCTACGAGGCCATCAAGGACGGCCGCATCAACCACGTCCTCGT
                                                                                                                                                                                 GCCCTCTGCCAACGTCACCCTTACTGCCGTCAACGCGTGGAAGGTTGCCTCGGCCGAGAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CGAGGTCAAGAAGGCGCTCAACAAGCGTCTCGAGCAAGACGACGACGTACGACCTCGAGCC 1823
                                                                             CTCGAACGTCTCCAAGATCTACGAGGCCATCAAGTCGGGCAGGATCAACAACGTCCTCCT
                                                                                                                                                        GCCCGCGCTCTCGTACCTCTCGCCGCGCACTCAGATCCTCTACGCCTTCGTCCGCGAGGA
                                                                                                                                                                                                                                                                                                                                                  GGCCATCTCGCTCACGCGCGAGGTGCGCAACCGCTTCTGGCAGACGCCGTTCTTCGCAGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GCGCTGGCACGACGCCTTCTCCTTCGCCGCCGCACCGTCGTCGAGGTCCTCCTCGTCGAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       GCGCTGGCACGACGCCTTCTCGTACGCGACCGGCACCGTCGTCGAGCTCCTCCTCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GAAGGTGAACAAGACGCTCGCCAAGCGCCTCGAGCAGACCAACTCGTACGACCTCGTCCC
                                                                                                                                                                                                                                                                                                                 GGCCATCTCGCTCACCCGCCAAGTCCGCGAGACCTTCTGGTCCGCCGCGCGTCGACCTCGTC
                                                                                                                                                                                                                                                                                                                                                                                                  -GCTCTCGCTCGCCGCCGTCAACGCCTGGAAGGTCGCCGCCGCCGAGTC
                                                                             2135
                                                                                                                                                                                                                                                                           2063
                                                                                                                                                                                                                                                                                                                                                                                                1895
                                                                                                                                                                                                                                                                                                                                                                                                                                      1943
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1883
                                                                                                                   2183
                                                                                                                                                        2075
                                                                                                                                                                                                2123
                                                                                                                                                                                                                                      2015
                                                                                                                                                                                                                                                                                                                   1955
                                                                                                                                                                                                                                                                                                                                                         2003
                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1844
```

상

Š ď Ş 맑 δ 유 성 ď

```
Sequence 18, Application US/09524693A

Patent No. 6355468

GENERAL INFORMATION:
APPLICANT: Yoshida, Roberta
APPLICANT: Yoshida, Roberta
APPLICANT: Yoshida, Roberta
TITLE OF INVENTION: Phenylallanine Ammonia Lyase Polypeptide and
TITLE OF INVENTION: Polymucleotide Sequences and Methods of Obtaining and
TITLE OF INVENTION: Using Same
FILE REFERENCE: 29479/500NSC
CURRENT APPLICATION NUMBER: US/09/624,693A
CURRENT FILING DATE: 2000-07-24
NUMBER OF SEQ ID NOS: 25
SOFTWARB: Patentin Ver. 2.0

SEQ ID NO 18
LENGTH. 2318
                                                                                                                                                                                                                                                                                                                                                                                                                 FEATURE:
NAME/KEY: CDS
LOCATION: (1)..(2148)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              LENGTH: 2439
TYPE: DNA
ORGANISM: Rhodotorula toruloides
                                                                                                                                                                                                                                                                                             atch 49.5%; cal Similarity 74.0%; 1565; Conservative
                                            GÁCCGÁCTCGACGCTCGAACTCGACGGCTACTCGCTCAACCTCGGAGACGTCGTCTCGGC
                                                                                               GCACCTGCCCACAACCCAGGTCACGCAGGTCGACATCGTCGAGAAGATGCTCGCCGCGCC
                                                                                                                              CGATGGCCACGCGCACCAGTCGCAGCTCGAGATCGTGCAGGAGCTCCTCAGCGACCC
                                                                                                                                                                                        CGTCGCATCCGCAAAGCAGGCTGTCAATGGCGCCTCGACCAACCTCGCAGTCGCAGGCTC
                                                                                                                                                                                                                                        ceccecroceaccaaerceecrecescocacriceecroceccacecceccececciceecroceccocec
                                                                                                                                                                                                                                                                                             Score 1196.6; DB 4;
Pred. No. 3.9e-223;
1; Mismatches 525;
                                                                                                                                                                                                                                                                                             Indels
                                                                                                                                                                                                                                                                                                                                            Length
                                                                                                                                                                                                                                                                                               24;
                                                                                                                                                                                                                                                                                             Gaps
                                                                                                                                                                                              104
                                                                                               164
                                            278
                                                                                                                                           218
```

유 片 Ş

224

유

뮍 δ 정 δÃ g.

밁 Ş

Š

Дb Ş 밁 5 дb 8 밁 S 뮍 δ0 멍

1415	1356 CAACTTCACGCAGTGCACCGAGTTGCTCAACGCTGCCATGAACCGCGGCCTGCCT	
0 0	GTGGGCTGTCTCGATTTCGATGGAGAAGACCAGGCTCGCCCAGATCGGCAAG 	
2 4 1	236 CGACAACCCCTCCTCGACGTCGACAACAAGAGAGAGACAGCCGGCAACTTCCAGG 185 CGACAACCCTCTCATCGACGTCGACAACAGAGACAGAGAGAG	
1 8 3	ATGCACGCCTACTCGACTCTCTCGCTCGAGAACAACACGACGA	
	CTCGGCCCGC	
1118 1064	1059 CCTTTCCGGCTCGTTGTCCGTTGAGCACGAGGAGGAGGTCAAGGTCAAGGACGACGA	
1058	999 CCACGACGTCTGCCGCCCCGCACCCCGGCCAGGTCGAGGTCGCGCAACATCCGCACGCT	
9 9 9 9 8 4 4 8	3000 	
ω ω	879 CGCCTCGATGGCGACCCTCAGTCTGCACGACTCGCACATGCTCTCGCTCTCGCAGGC	
	9 CGAGGCAGTCGTCCTCGGCCCGAAGGAAGGTCTCGGTCTGGTCAACGGAACGGCCGTCTC 	
818 764	TCGCTCTTTGGTCT	
758 704	н—н	
698 644	639 GAACCACCGCATCACGCCATCGTCCCCTCCGCGGCTCCATCTCCGGCGTCGGGCGACCT	
638 584	579 GCTCACGCGTGGCCACTCGGCCGTCGGCCGTCGTCGTCGTGAGGCGCTCACCAACTTCTT	
578 524	519 CCTCGAGAACACGCTTCCGCTCGAGGTCGTCGCGGGGCGCCATGGTCATCCGCGTCAACTC	
518 464	59 CGAGCACCAGCTCTGCGGCGTGACGCCGACGTCCGYCTCGTCCTTCAGCGTCGGACGCGG	
458 404	9 TTTCGGTGGCTCGGCCGACACGAGGACTGAGGATGCAGTCAGCCTCCAGAAGGCGCTCAT	
398 344	CTTCAGAACTCGGTCTACGGAGTCACCACGGG                         	
338 284	CGACGAGATCCGCGCACGCGTCGA 	

밁

Ş

Š

S

Š

55 A B SS

밁

Š

B

S

밁

Š

망

\* \* \* \* \* \*

8 2 8 2 8 2

```
8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            ঠ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               뮍
                                                        Š
                                                                                                                                                         В
                                                                                                                                                                                                                      Ó
                                                                                                                                                                                                                                                                                                                      밁
                                                                                                                                                                                                                                                                                                                                                                                                          Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1485
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1476
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1305
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1536
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1425
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1365
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1845
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1785
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1824
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1764
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1665
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1605
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1656
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1545
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1896
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1944
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1884
2136
                                                                                                                                                                 2076
                                                                                                                                                                                                                                                2124
                                                                                                                                                                                                                                                                                                                               2016
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1956
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                2004
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               CGAGGTCAAGAAGGCGCTCAACAAGCGTCTCGAGCAGGAGGACGACGTACGACCTCGAGCC 1823
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CCTCGCTCCCGAGGACCCGTCGCTCAACTATCACCGCCAAGGGCTTGGACATTCACATCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CAACTTCACGCAGCTCACCGAGATGCTCAACGCCGCATGAACCGCCGGCCTCCCTG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  grecaaceacerectricierectedeceacecaceractedecerretecaagecar
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      GGCCAACGACCTTTCTCTCCTTCTCGCCTCGCACCTGTACTGCACGCTCCAGGCCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    readaredecaaceadecedreaacrederrececreareredecredereceaeceda
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   AGAGATGGGCAAACCAGGCCGTCAACTCGCTCGCTCATCTGCGGGGGGGCGCACTGCCGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      gécernacacer e de admired de acacer e de caracer de carer de carer
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          TGCTTACGCTTCGGAGCTCGGCCAGCCTTGCCAACCGGTCACCTTCGTCCAGCCCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ceredecedeceda de la contracta de la contracta
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            GGCCATCTCGCCTCACGCGCGAGGTGCGCAACCGCTTCTGGCAGACGCCGTCTTCGCAGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CATCGACCAGCACTTTGGCTCCGCCATGACCGGCTCGAACCTGCGCGACGAGCTCGTCGA 1724
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 cerceaceacacerececacecereaceres.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CGACTTGCGCGCGATCGAGTTCGAGTTCAAGAAGCAGTTCGGCCCAGCCATCGTCTCGCT
    CAAGATGCTCGCTTA 2150
                                                                      CAAGATGCTCGCGTA
                                                                                                                                                         CTCGAACGTCTCCAAGATCTACGAGGCCATCAAGTCGGGCAGGATCAACAACGTCCTCCT
                                                                                                                                                                                                                  GAGCAACGTCTCGCGCATCTACGAGGCCATCAAGGACGGCCGCATCAACCACGTCCTCGT
                                                                                                                                                                                                                                                                                                                      ddccarcicactcacccdccaadiccddcaagacciriciddrecedceddicaaccredre
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 GTC-----GCTCTCGCTCGCCGCCGTCAACGCCTGGAAGGTCGCCGCCGCCGAGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       GCCCTCTGCCAACGTCACCCTTACTGCCGTCCAACGCGTGGAAGGTTGCCTCGGCCGAGAA 1943
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ĠĊĠĊŤĠĠĊĄĊĠĄĊĠĊĊŤŤĊŤĊĊŤŦĊĠĊĊĠĊĊĠĠĊĄĊĊĠŤĊĠŤĊĠĄĠĠŦĊĊŤĊŤĊĠŤĊĠĄĊ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                GCGCTGGCACGCCTTCTCGTACGCGACCGGCACCGTCGTCGAGCTCCTCTCTCGTCCTC 1883
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                gaágergaácaágacecregecaágececregageagaceaacregraceácerecec
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CGACCTCCGCGCGATGGAGCTCGACTTCAAGAAGCAGTTCGACCCGCTTCTCCCGACTCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     decededenenceracerecededededenencasareceretadeserricerededades
                                                                                   2198
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1475
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1784
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1715
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1604
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1655
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1544
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1484
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1535
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1424
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1364
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1664
                                                                                                                                                                                                                                                             2183
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1955
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   2003
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1895
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1844
                                                                                                                                                                                   2135
                                                                                                                                                                                                                                                                                                                                            2075
                                                                                                                                                                                                                                                                                                                                                                                                                           2123
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              2015
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             2063
```

RESULT 6
US-09-627-216A-7
US-09-627-216A-7
Sequence 7, Application US/09627216A
Sequence 7, Application US/09627216A
Patent No. 636837
GENERAL INFORMATION:
APPLICANT: Gariaslani, Sima F
APPLICANT: Garg, Xiao-Song
APPLICANT: Qi, Wei
APPLICANT: Vannelli, Todd
APPLICANT: Gatenby, Anthony
TITLE OF INVENTION: Bioproduction of para-Hydroxycinnamic Acid
FILE REFERENCE: BC1009 US NA
CURRENT APPLICATION NUMBER: US/09/627,216A

```
밁
                             Ś
                                                              뮍
                                                                                     $
                                                                                                                                                                 δ
                                                                                                                                                                                                      유성
                                                                                                                                                                                                                                                                             유왕
                                                                                                                                                                                                                                                                                                                                                 뭕
                                                                                                                                                                                                                                                                                                                                                                                      Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                   B
                                                                                                                                                                                                                                                                                                                                                                                                                                                              γQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Вb
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      γ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   д
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         망
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      D,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               ; TYPE: DNA; CANDOTORULA; ORGANISM: Rhodotorula US-09-627-216A-7
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Query Match
Best Local Similarity 73.9
Matches 1564; Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CURRENT FILING DATE: 2000-07-27
PRIOR APPLICATION NUMBER: 60/147,719
PRIOR FILING DATE: 1999-08-06
NUMBER OF SEQ ID NOS: 14
SOFTWARE: Microsoft Office 97
SEQ ID NO 7
LENGTH: 2151
                             939
                                                                825
                                                                                                   879
                                                                                                                                                                         819
                                                                                                                                      765
                                                                                                                                                                                                              705
                                                                                                                                                                                                                                               759
                                                                                                                                                                                                                                                                                     645
                                                                                                                                                                                                                                                                                                                          699
                                                                                                                                                                                                                                                                                                                                                           585
                                                                                                                                                                                                                                                                                                                                                                                                639
                                                                                                                                                                                                                                                                                                                                                                                                                                   525
                                                                                                                                                                                                                                                                                                                                                                                                                                                                      579
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           465
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   405
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              519
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      459
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         345
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               399
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    285
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     339
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            225
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             279
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                165
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     219
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  4.
U
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    99
 CTTGACGGCTCTCACGGTGGAGGCCATGGTCGGCCAGCAGGGCTCGTTCGCGCCCGTTCAT
                                                        Addatodatodeckieriegerierigekedakeerekearigereregerieriegekere
                                                                                 CGCCTCGATGGCGACCCTCAGTCTGCACGACTCGCACATGCTCTCGCGCTCCTCTCGCAGGC
                                                                                                                                CGAGCCCGTCGTCGTCGGCCCGAAGGAAGGTCTCGGTCTCGTCAACGGCACCGCCGTCTC
                                                                                                                                                      CGAGGCAGTCGTCCTCGGCCCGAAGGAGGGTCTCGGTCTGGTCAACGGAACGGCCGTCTC
                                                                                                                                                                                                        CGTCCACGAGGGCAAGGAGAAGATCCTGTACGCCCGCGAGGCGATGGCGCTCTTCAACCT
                                                                                                                                                                                                                                TTTGCACGAGGGAACCGAGAAGATCATGTTTGCGCGCGAGGCCCATCTCGCTCTTTGGTCT
                                                                                                                                                                                                                                                                               GTCTCCTCTCTACATTGCAGCGGCCATCAGCGGTCACCCGGACAGCAAGGTGCACGT
                                                                                                                                                                                                                                                                                                                                                   GAACCACCGCATCACGCCCATCGTCCCCCCCCCGCGGCTCCATCTCGGCCGTCGGGCGACCT
                                                                                                                                                                                                                                                                                                                                                                                                                             CTTGACCCGCGGCACTCGGCTGTCCGCCTCGTCGTCGAGGCGCTCACCAACTTCCT
                                                                                                                                                                                                                                                                                                        CAGCCCGCTCTCGTACATCGCCGGCCCCCACCCCCCACGTCAACGTTCACGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                   GCTCACGCGTGGCCACTCGGCCGTCCGTCCTTCGAGGGCGCTCACCAACTTCTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CCTCGAGAACACGCTTCCGCTCGAGGTCGTCCGCGGGGGCCCATGGTCATCCGCGTCAACTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        GACCGACTCGACGCTCGACGGCTACTCGCTCAACCTCGGAGACGTCGTCTCGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             CGAGCACCAGCTCTGCGGTTCTCCCCTTCGTTCGACTCGTTCCGCCTCGGCCGCGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    ATTTGGCGGATCCGCAGACACCGCACCGAGGACGCCATCTCGCTCCAGAAGGCTCTCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     TCTCGAGAACTCGCTTCCCCTCGAGGTTGTTCGCGGGGCGCCATGACAATCCGCGTCAACAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CGAGCACCAGCTCTGCGGCGTGACGCCGACGTCCGTCCTTCAGCGTCGGACGGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CAAATCGGTCGAGTTCTTGCGCTCGCAACTCTCCATGAGCGTCTACGGCGTCACGACTGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 CAAGAGCGTCGACTICCTCAAGGCCCAGCTTCAGAACTCGGTCTACGAGTGACCACGGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GCACCTGCCCACAACCCAGGTCACGCAGGTCGACATCGTCGAGAAGATGCTCGCCGCGCCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             TTTCGGTGGCTCGGCCGACACGAGGACTGAGGATGCAGTCAGCCTCCAGAAGGCGCTCAT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CGCGAGGAAGGGCAGGCCTGTCCGCGTCAAGGACAGCGACAAGATCCGCTCAAAGATTGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CGCCCGCAAGGGCGCAGGGTCCAGAACGACGACGAGATCCGCGCACGCGTCGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CACCGACGACGTCGTCGAGCTCAGCGGGTACAGCCTCACCGTCGTGACGTTGTCGGCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CGATGGCCACGCGCGCACCAGTCGCAGCTCCAGAGATCGTGCAGGAGCTCCTCAGCGACCCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CGTCGCATCCGCAAAGCAGGCTGTCAATGGCGCCTCGACCAACCTCGCAGTCGCAGGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              ceccecceaccayerceeccecceccactriceecrocecceccaceccceccc
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    49.4%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              glutinis
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     ۳.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Score 1195; DB 4; Length 2
Pred. No. 7.8e-223;
1; Mismatches 526; Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      2151;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 24;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Gaps
                       998
                                                          884
                                                                                           938
                                                                                                                                  824
                                                                                                                                                                     878
                                                                                                                                                                                                      764
                                                                                                                                                                                                                                            818
                                                                                                                                                                                                                                                                               704
                                                                                                                                                                                                                                                                                                                  758
                                                                                                                                                                                                                                                                                                                                                       644
                                                                                                                                                                                                                                                                                                                                                                                          869
                                                                                                                                                                                                                                                                                                                                                                                                                             584
                                                                                                                                                                                                                                                                                                                                                                                                                                                                  638
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     524
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        578
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             464
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 518
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         458
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      404
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            344
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  284
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       338
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             278
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         104
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  164
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      218
                             8
                                                              ф
                                                                                                 Ś
   g
                                                                                                                                              밁
                                                                                                                                                                         5
                                                                                                                                                                                                                  뫄
                                                                                                                                                                                                                                                 Ś
                                                                                                                                                                                                                                                                                     D<sub>D</sub>
                                                                                                                                                                                                                                                                                                                            Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                           망
                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           멍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  뫄
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ϋ́
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        g
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                1725
                                                                                                                                                                                                                                                                                                                                                                                                          1716
                                                                                                                                                                                                                                                                                                                                                                                                                                               1605
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1596
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1485
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1476
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1545
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1425
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1365
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1416
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1185
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1245
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1236
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1065
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1119
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1005
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1059
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         885
                       GGCCATCTCGCTCACGCGCGAGGTGCGCAACCGCTTCTGGCAGACGCCGTCTTCGCAGGC
                                                                                                                                                                                                                GAAGGTGAACAAGACGCTCGCCAAGCGCCTCGAGCAGACCAACTCGTACGACCTCGTCCC
GCCCGCGCTCTCGTACCTCTCGCCGCGCACTCAGATCCTCTACGCCTTCGTCCGCGAGGA
                                                                                                                                                                       GCCCTCTGCCAACGTCACCCCTTACTGCCGTCAACGCTGGAAGGTTGCCTCGGCCGAGAA
                                                                                                                                                GTC-----
                                                                                                                                                                                                                                                                                                                CGAGGTCAAGAAGGGCTCAACAAGCGTCTCGAGCAGACGACGACGTACGACCTCGAGCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CATCGACCAGCACTTTGGCTCCGCCATGACCGGCTCGAACCTGCGCGACGAGCTCGTCGA
                                                                                                                                                                                                                                                                                                                                                                                                    ccrccaecaecaccreecacreeccreacerca-----acecacreecer
                                                                                                                                                                                                                                                                                                                                                                                                                                         CGACTTGCGCGCGATCGAGTTCGAGTTCAAGAAGCAGTTCGGCCCAGCCATCGTCTCGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CGACCTCCGCGCGATGGAGCTCGACTTCAAGAAGCAGTTCGACCCGCCTTCTCCCCGACTCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             GRECAACGAEGTECTTETETETECTECTEGECACCEACCTACTGEGGTTETECAAGECAT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    GGCCAACGACGTTTCTCTCTCTTCTCGCCTCGCACCTGTACTGCACGCTCCAGGCCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               GÉCGTACACCTCÉGAGTTGEGACACCTCÉCCAACCCTETGACGACGCATGTCCAGCCGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      CCTCGCGGCCGAAGACCCCTCGCTCTCCTACCACTGCAAGGGCCTCGACATCGCCGCTGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   CCTCGCTGCCGAGGACCCGTCGCTCAACTATCACGGCAAGGGGCTTGGACATTCACATCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   TGCTTACGCTTCGGAGCTCGGCCACCTTGCCAACCCGGTCACTACCTTCGTCCAGCCCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                TGCCGCTGTGGCCAACACCATGGAGAGACTCGCCTCGGGCTCGCCCAGATCGGCAAGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CGACAACCCTCTCATCGACGTCGAGAACAAGACTTCGCACCACGGCGGCAATTTCCAGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      CGACAACCCGCTCCTCGACGAGAACAAGCAGACCGCGCAACGGCGGCAACTTCCAGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         encegergienes en la contra de la contra del la contra della contra 
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                GGGCATTCTCCGCCAGGACCGCTACCCCTTGCGCACGTCTCCTCAGTGGCTCGGCCCGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    GGGCATTCTTCGCCAGGACCGCTACCCCGCTCCGCACGTCGCCTCAGTTCCTCCGCCCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         TCACGACGTCACGCGCCTCACCCGACGCAGATCGAAGTCGCGGGAAACATCCGCAAGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CCTCGAGGGAAGCCGCTTTGCTGTCCACCATGAGGAGGAGGTCAAGGTCAAGGACGACGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      CCTITCCGGCTCGTCGTTTGCCGTTGAGCACGAGGAGGAGGAGGTCAAGGTCAAGGACGACGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   GCTCACGGCCATGACGGTCGAAGCGATGGTCGGCCACGCCGGCTCGTTCCACCCCTTCCT
                                                                                                                                          - GETÉTEGÉTEGÉCÉGTÉAACGÉCTGGAAGGTEGÉCECEGECGAGTE
2015
                                                                                                                                                                                                                                                                                                                             1823
                                                                                                                                            1895
                                                                                                                                                                                                                    1844
                                                                                                                                                                                                                                                       1883
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1604
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1655
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1544
                                                                                                                                                                                                                                                                                                                                                                                                                                         1664
                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1715
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1484
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1535
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1424
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1364
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1415
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1304
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1355
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1184
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1178
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1244
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1295
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1235
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1124
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1064
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1004
```

	2064 G 2016 G 2016 G 2124 G 2076 C 2184 C 2186 C
B	8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8
813 CGARGGASTCANGANAGARGTCTTACGCCCOLLAGGASGASTCGARGGGCGCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC	465 TCTCGAGAAACTCGCTTCCCCTCGAGGTTGTTCGCGGGCCATGACAATCCGCGTCAACAACTTCTT 638 579 GCTCACGCGTGGCCACTCGGCCGTCCGCCTCGTCGTCCTTGAGGCGCTCACCAACTTCTT 638 525 CTTGACCGCCACTCGGCCGTTCCGCCCTCCTCGAGGCGCTCACCAACTTCTT 584 639 GAACCACCGCATCACGCCATCGTCCCCCTCCGCGGCGTCCATCTCGGGGCGACCT 698 639 CAACCACGGCATCACCCCATCGTCCCCCTCCGCGGGCTCCATCTCTGCGGGCGACCT 644 699 CAGCCACGGCATCACCCCCATCGTCCCCCTCCGCGGGCGACCATCTCTGCGTCGGGCGACCT 759 645 GTCTCCTCTCTCTACATTGCAGCGGCCATCACCGGTCAACGCTCAAGGTTCACGGT 759 TTTGCACGAGGAACCCGAGAATCAACGGCACATCTTGCGGGACACGTCACGTTCACGAGAACAACGGTTCACGGTTCACGGTTCACGGTTCACGGTTCACGGTTCACGAGAACAACGAGAACAACGGTTCACGGTTCACGGTTCACGGTTCACGGTTCACGGAGAACAACGGTTCACGGTTCACGGTTCACGGTTCACGGTTCACGGAGAACAACGGTTCACGGTTCACGGTTCACGGTTCACGGTTCACGGAGAACAACGGTTCA

Query Match 49.1%; Score 1188.8; DB 4; Length 2061; Best Local Similarity 75.2%; Pred. No. 1.2e-221; Matches 1529; Conservative 1; Mismatches 478; Indels 24; Gaps 3;  Oy 182 CGCAGCTCGAGATCGTGCAGGAGCTCCTCAGCGACGACGACGACGACGTCGAGCTCA 241	; SEQ ID NO 31 ; LENGTH: 2061 ; TYPE: DNA ; ORGANISM: mutant from Rhodotorula glutinis ; FEATURE: ; FEATURE: ; NAME/KEY: CDS] ; LOCATION: (1)(2061) US-09-765-873A-31	CURRENT FILING DATE: 2001-C PRIOR APPLICATION NUMBER: US PRIOR FILING DATE: 2000-07-Z PRIOR APPLICATION NUMBER: US PRIOR FILING DATE: 1999-08-C PRIOR FILING DATE: 1999-08-C NUMBER OF SEQ ID NOS: 38 SOPTWARE: Microsoft Office	; Patent No. 6521748 ; GENERAL INFORMATION: ; APPLICANT: Tang, Xiao-Song ; TITLE OF INVENTION: BIOPRODUCTION OF PARA-HYDROXYCINNAMIC ACID ; FILE REFERENCE: BC1009 US CIP ; CURRENT APPLICATION UNMBER: US/09/765.873A	RESULT 8 VUS-09-765-873A-31 VS-09-765-873A	CAAGATGCTCGCTTA			2 1	1896 GCCGGCGCATACCTCTCGCCGCGCACGCTTCTGGTACTGCTTCGTTCG	1944 GGCCATCIGCGAGGGCGAGGGTGGAGGTGGAGGTTGCCTCGGCGAGAGGTTGCCTCGGCGAGAGGTCGCGAGGAGGTCGCGAGGAGGTCGCGAGGAGGTCGCGAGGAGGTCGAGGGGAGGTCGAGGGTCGAGGGTCGAGGGTCGAGGGTGGGAGGTCGAGGGTGGGAGGTCGGGGAGGTCGAGGGTGGGGAGGTCGGGGGGGG		1725 GAAGGTGAACAAGACGTTCTCTCTATACGCAACCGACTCGAACCTCGACCTCCTCCTCCTCCTCCTCCTCCTCCTCCTCCTCCTCCT		Db 1605 CGACTTGCGCGCGATTCGAGTTCAAGAAGCAGTTCGGCCCAGCCATCGTCTCGCT 1664  QY 1716 CCTCCAGCAGCACCTCGGCACTGGCCTCGACGTCAACGCACTTGCGCT 1763	OY 1656 CGACCTCCGCGCGATGGAGCTCGACTTCAAGAAGCAGTTCGACCGCCTTCTCCCGACTCT 1715
Q	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	7 da 4a	Q dd V	D Qy	g Q	DB Qy	Db Qy	Db Db	Qy Db	da Võ	Qy dd	dg VQ	B &	B &	рь
1202 ACTCGACTCTCTCGCTCGAGAACAACACGACGACCGACCACCGCTCCTCGACGTCG 1258	1082 TTGAGCACGAGGAGGAGGTCAAGGTCAAGGACGACGAGGACCATTCTTCGCCAGGACCGCT 1141		TGCACGACGCCCACATGCCTCTCGCCTCTCGCAGGCCTTCACGGCCATGCAGGGCCTCTCACGGTCGAGGGCCTCTCACGGCCAGGCCTCTCACGGCCAGAGGGCCTCCACGGCCAGAGGGCCAGAAGGGCCAGAAGGGCCAGAAGGGCCAGAAGGGCCAGAAGGGCCAGAAGGGCCAGAAGGGCCAGAAGGCCAGAAGGGCCAGAAGGGCCAGAAGGGCCAGAAGGGCCAGAAGGGCCAGAAGGGCCAGAAGGCCAGAAGGGCCAGAAGGGCCAGAAGGGCCAGAAGGGCCAGAAGGGCCAGAAGGGCCAGAAGGGCCAGAAGGGCCAGAAGGGCCAGAAGGGCCAGAAGGAGG	J 10	782 TCATGTTTGCGCGCGAGGCCATCTCGGTCTTTGGTCTCGAAGGCAGTCGTCCTCGGCCCGA 841	722 GCGCCATCACCGGTCACCCCGACGTCAAGGTTCACGTTTTGCACGAGGGAACCGAGGAAGA 781	662 TCCCCCTCCGCGGGCTCCATCTCGGCGGTCGGGGGACCTCAGCCGCGCTCTCGTACATCGCCG .721	602 TCCGCCTCGTCGTCCTTGAGGCGCTCACCCAACTTCTTGAACCACCGCATCACGCCATCG 661	0 4	CGCCGACGTCCGYCTCGGCCTCGGACGACGCCTCGAGAACACGCTTCCGCTCG	422 GGACTGAGGATGCAGTCAGCCTCCAGAAGGCGCTCATCGAGCACCAGCTCTGCGGCGTGA 481	362 CCCAGCTTCAGAACTCGGTCTACGGAGTCACCACGGGTTTCGGTGGCTCGGCCGACACGGA 421	302 GCGTCCAGAACGACGACGAGTCCGCGCGCGCGCGCGCGCG	242 GCGGGTACAGCCTCACCGTCACGTGTCGTGTCGGCGCCGCCAAGGGGCGCAAGGGTCC 301	

```
Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ϋ́
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ϋ́
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                岁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           ¥
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        ¥
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ¥
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            岁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       멼
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               망
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        á
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           ¥
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Я
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 RESULT 9
US-09-624-693A-16
Sequence 16, Application US/09624693A

Sequence 16, Application US/09624693A

Patent No. 6355468

GENERAL INFORMATION:

APPLICANT: KOOCETTA, Anna
APPLICANT: KOOCETTA, Anna
APPLICANT: KOOCETTA, Anna
APPLICANT: OF INVENTION: Phenylalanine Ammonia Lyase Polypeptide and
TITLE OF INVENTION: Phynucleotide Sequences and Methods of Obt
TITLE OF INVENTION: Using Same
FILE REFERENCE: 29479/500NSC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1439
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1559
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1358
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1298
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1178
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1499
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1238
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1319
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1769
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1907
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1718
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1847
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1658
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1787
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1598
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1739
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1538
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1679
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1478
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1619
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1418
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1949
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              2087
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1889
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    2027
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1829
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1967
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               2009
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           rectre de cace cacer a conserva de conserv
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          a credetro e de crea con concordo de consecuencia de consecuen
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        ACTCGCTCGCTCTCATCTCCGCGCGCCGCACTGCCGAGGCCAACGACGTCCTTTCTCTCC 1618
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ACCTC GCCAACCCTGTGÁCGACGCATGTCCAGCCGGCTGAGATGGCGAACCAGGCGGTCA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    ACCTTGCCAACCCGGTCACTACCTTCGTCCAGCCCGCAGAGATGGGCAACCAGGCCGTCA 1558
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              rerectaceaeraceaecaecaecaecaecaecaecaecaecaecaeceraecaecaecaecaec
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        TCAACTATCACGCCAAGGGCTTGGACATTCACATCGCTGCTTACGCTTCGGAGCTCGGCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             TGCTCAACGCCGGCATGAACCGCGGCCTCCCTCCTGCCTCGCGGGCCGAAGACCCCTCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      тестся дествествення в представаться представления представления в представления предст
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    AGAAGACTCGCCTCGGGCTCGCCCAGATCGGCAAGCTCAACTTCACGCAGCTCACCGAGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          AGAAGACCAGGCTCGCACTCGCCCTCATCGGCAAAGCTCAACCTTCACGCAGTGCACCGAGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ACGCGACCGGCACCGTCGTCGAGCTCCTCGTCGTCCTCGCCCTCGCCCAACGTCACCCTTA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       AGCGTCTCGAGCAGACGACGACGTACGACCTCGAGCCGCGCGCTGGCACGACGCCTTCTCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CCATGACCGGCTCGAACCTGCGCGACGAGCTCGTCGAGAAGGTGAACAAGACGCTCGCCA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    GCCTCGACG------TCAACGCACTTGCGCTCGAGGTCAAGAAGGCGCTCAACA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           AGTTCAAGAAGCAGTTCGGCCCAGCCATCGTCTCGCTCATCGACCAGCACTTTGGCTCCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              ACTTCAAGAAGCAGTTCGACCCGCTTCTCCGACTCTCCCAGCAGCACCTCGGCACTG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CTGCCGTCAACGCGTGGAAGGTTGCCTCGGCCGAGAAGGCCATCTCGCTCACGCGCGAGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               redecededaceredresidades recenerates recen
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       AGCGCCTCGAGCAGACCAACTCGTACGACCTCGTCCCGCGCTGGCACGACGCCTTCTCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GAGACGICITCCTCGGCAAGCAAGAGGTGACGATCGGCTCGAACGTCTCCAAGATCTACG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GCGACGTGTTTGTCGGCGTGCAGCAGGAGAGAGATCGGGAGCAACGTCTCGCGCATCTACG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          cgcgcacgcgcgroctgractcgrrocgroadgagcrcggcgrgcaggcaggcggg
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         cedecerea a concerción de la concentración de 
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               AGGCCATCAAGTCGGGCAGGATCAACAACGTCCTCCAAGATGCTCGCTTA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        AGGCCATCAAGGACGGCCGCATCAACCACGTCCTCGTCAAGATGCTCGCGTA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     ĊĠĊĠĊĀĊŢĊĄĠĀŤĊĊŤĊŤĀĊĠĊĊŤŤĊĠŤĊĊĠĊĠĀĠĠĀĠĊŤŢĠĠĊĠŤĊĀĀĠĠĊĊĊĠĊĊĠĊĠ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           rcceceáeacerrcreercecececerceacercercececececercreráceracere
                                                                                                                                                                                 Obtaining
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    2060
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             2198
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1498
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1438
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1237
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1378
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1417
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1297
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1966
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1768
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1906
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1846
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1657
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1738
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1537
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1678
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1477
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                2026
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1828
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1717
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1597
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1948
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          2086
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    2008
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          2146
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               뫄
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             20
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Š
                                                                                                                                                                                                                    Ó
                                                                                                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ó
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                               1404
```

```
; TYPE: DNA; ORGANISM: Rhodotorula m; FEATURE: RAME/KEY: CDS; LOCATION: (646)...(2784) US-09-624-693A-16
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CURRENT APPLICATION NUMBER: US/09/624,693A
CURRENT FILING DATE: 2000-07-24
NUMBER OF SEQ ID NOS: 25
SOFTWARE: PatentIn Ver. 2.0
SEQ ID NO 16
LENGTH: 2787
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Query Match
Best Local Similarity
Matches 1557; Conserv
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1236
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1176
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1116
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1056
                                                                                                                                                                                                             1356
                                                                                                                                                                                                                                                                                                                                                                                                                                                                1296
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              816
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                636 AGCTCTCAAGATGGCCCCCTCCGTCGACTCGATCGCGACTTCGGTTGCCAACTCCCTCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           627
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        567
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      507
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            447
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             996
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          387
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          936
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       327
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 876
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    267
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  207
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            756
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         147
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         696
                                                                                         807
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              687
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      87
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          27
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             AGCACTCGCGATGGCCCCTTCCTTGGACTCGCTCGCCACCACGCTCGCCAACGGCTTTAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            recreecrocorcocoaccaccas acas coas consiste de la recrea del la recrea della recrea
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CACGCCCGGCCTCGATGGCCACGCCGCGCACCAGTCGCAGCTCGAGATCGTGCAGGAGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   GAACGGGTTGCACGCCGCCGCCCCAACGGTGGCGACGTCCACAAGAAGACGGCCGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      CAACGGCTCGCACGACCAAGTCGGCTGCGGGCCCCACTTCGGCTCTCCGCCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        GGCCGACGCCGGCGACGGACCAGATCAAACTCGATGGGTACACCCCTCACGCTCGCGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            gcrcddreddecrcdadaacrcdcrrcdarcdaadrcdrcdaddccardaccar
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GAAGGCGCTCATCGAGCACCAGCTCTGCGGGGTGACGCCGACGTCCGYCTCGTCCTTCAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      TGTCACGACTGGTTTCGGCGGCTTCGGCCGACACCCCGGACTGAGGATGCGATCTCGCTTCCA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          AGTCACCACGGGTTTCGGTGGCTCGGCCGACACGAGGACTGAGGATGCAGTCAGCCTCCA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CGAGAAGATCGATGCCAGTGTCGAGTTCCTCCGTACTCAGCTCGACAACAGTGTCTACGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CGCACGCGTCGACAAGAGCGTCGACTTCCTCAAGGCCCAGCTTCAGAACTCGGTCTACGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 CONCORTO GO CONTROL TO CONTROL CONTROL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              сеттетсеесессессесьянееесесьное протостительного подпоставления протостительного подпоставления протостительного подпоставления подпоставления
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CACCAACTTCTTGAACCACCGCATCACGCCCATCGTCCCCCTCCGCGGCTCCATCTCGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CGTCGGACGCGCGCCTCGAGAACACGCTTCCGCTCGAGGTCGTCCGCGGCGCCATGGTCAT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           ccecercaacroegroegereaccacroegecercececercercercereries
                                            GCTCTTTGGTCTCGAGGCAGTCGTCGTCCTCGGCCCGAAGGAGGGTCTCGGTCTGGTCAACGG
                                                                                                                                                                                                                   GAAGGTCCACGT-----
                                                                                                                                                                                                                                                                                                                                                                                                                                                          ĠŦĊĠĠĠĊĠĂĊĊŤŦŦĊĊĊĊĊŤĊŦĊŦŦĂĊĂŤĊĠĊĊĠĊĊŦĊĠĂĬĊĂĊĊĠĠĊĊĂĊĊĊĠĠĀĊŦĊ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    caccaactricercaaceacarcaceccarceccarecerecerrecaaceacearecare
                                                                                                                                                                                                                                                                                                             AAAGGTTCACGTTTTGCACGAGGAACCGAGAAGATCATGTTTGCGCGAGGCCATCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             47.0%;
71.6%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        mucilaginosa
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Score 1136.6; DB 4;
Pred. No. 1.6e-211;
1; Mismatches 590;
                                                                                                                                                                                                                   ---cgaceecaagatcatetccecccaggaggcgatcec
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          2787
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                27;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                146
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          695
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     815
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   86
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1175
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1115
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              326
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        875
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         206
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1235
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1055
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          446
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 935
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   755
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               566
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      506
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    995
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       386
1463
                                                                                                                                                                                                                                             1403
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1355
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1295
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           686
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  626
                                                                                                                   866
                                                                                                                                                                                                                                                                                                                                                                908
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              746
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       4
```

GCTCAAGGGTCTTCAGCCCGT

```
Š
                  Ş
                                                                          밁
                                                                                                                                                                                            밁
                                                                                                                                                                                                                                              Ś
                                                                                                                                                                                                                                                                                                     В
                                                                                                                                                                                                                                                                                                                                                          Ş
                                                                                                                                                                                                                                                                                                                                                                                                                              В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                         5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 đ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  γ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               B,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                              2304
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1704
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1644
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                2184
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1584
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  2124
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1524
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1464
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    2004
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1404
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1944
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1344
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     2064
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1884
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1284
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1824
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1224
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1764
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1167
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1704
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1107
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1644
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1584
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1047
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1524
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1464
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         987
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         927
         GGCCATCTCGCTCACGCGAGGTGCGCAACCGCTTCTGGCAGACGCCGTCTTCGCAGGC
                                                                                                      CCCTCTGCCAACGTCACCCTTACTGCCGTCAACGCGTGGAAGGTTGCCTCGGCCGAGAA
                                                                                                                                                                                GCGGTGGCACGACACGTTCTCGGTCGCGACCGGTGCCGTCGTCGAGGCGCTCGCCGGCCA
                                                                                                                                                                                                                                 GCGCTGGCACGACGCCTTCTCGTACGCGACCGGCACCGTCGTCGAGCTCCTCCTCCTCCTC
                                                                                                                                                                                                                                                                                                  CAAGGTCCGCAAGTCGATCTACAAGCGGTTGCAGCAGAACAACTCGTACGACCTCGAGCA
                                                                                                                                                                                                                                                                                                                                    CGAGGTCAAGAAGGGCCTCAACAAGCGTCTCGAGCAGACGACGACGACGTCGAGCCTCGAGCC 1823
                                                                                                                                                                                                                                                                                                                                                                                                                     GGTCACTGAGCTGTTGAAGCAGCACTTTGGC---GCGCTCGCGACGGCCGAAGTCGAGGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GCTCCAGGCCGTCGACCTCCGCCGCGATIGGAGCTCCAAGAAGCAGTTCGACCCCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CGTCCAGCCGGGCGAGATGGGCAACCAGGCCATCAACTCGCCTCGCCCTCATCTCGGCCCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CATTCACATCGCTGACGCTTCGGAGCTCGGCCACCTTGCCAACCCGGTCACCTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CATCGGCAAGCTCAACTTCACGCAGTGCACCGAGTTGCTCAACGCTGCCATGAACCGCGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            AGCCTTCATGGCGAGCAGCGTCGGAAACACGATGGAGAAGACTCGCCTCGCCGTCGCGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CAACTTCCAGGCGTCGGCTGTCTCGATTTCGATGGAGAAGACCAGGCTCGCACTCGCCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CCTCCAGGCCGTCGACCTCCGCGCGATGGAGTTTGAGCACACCAAGGCGTTCGAGCCGAT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         ccecaccecaéceaaceacerrererecerecrecies es aceacereracion
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ccreccrrcereccrecceaegacccercereacrareacegecaaegecrrega
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             GATGGGCAAGGTCAGCTTTACTCAGCTCACCGAGATGCTCAACGCCGGCATGAACCGGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               TCAGTCGACCACCGACAACCCGCTGATCGACCTCGAGAACAAGATGACCCACCATGGCGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CAACACGACGACGACAACCCGCTCCTCGACGTCGAGAACAAGCAGACGACGGCGGACGGCGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CATTGCTGCGGCCTACACTTCCGAGCTCGGTCACCTTGCCAACCCGGTTTCGACCCA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 CAAGGACGACGAGGCATCCTCAGGCAGGACCGGTACCCGCTCCGCTGCTCGCCGCAGTG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   CAAGGACGACGAGGCATICTICGCCAGGACCGCTACCCGCTCCGCACGTCGCCTCAGTT 1166
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CATCCGGACTCTTCTCGAGGGCAGCAAGTACGCCGTCCACGAGACTGAAGTCAAGGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CATCCGCACGCTCCTTTCCGGCTCGTCGTTTGCCGTTGAGCACGAGGAGGAGGTCAAGGT 1106
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CCACCCATTCCTCCACGACGTCACGCGCCCTCACCCGACCCAGATCGAGGTGGCGCGCAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CGCGCCGTTCATCCACGACGTCTGCCGCCCGCCACCCCGGCCAAGGTCGAGGTCGCGCGCAA 1046
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             CCTCTCGCAGGCCTTGACGGCTCTCACGGTGGAGGCCATGGTCGGCCAGCAGGAGGCTCGTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       chodecoercrocedorios resociones con contra con contra con contra con contra con
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        cercecadades de creacidades de la composição de la compos
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         AACGGCCGTCTCCGCCTCGATGGCGACCCTCAGTCTGCACGACTCGCACACATGCTCTCGCT
                                                                    -GAGGTCTCGCTCGAGCCTCAACGCCTGGAAGGTCGCCTGCGCCGAGAA
                                                                2531
                                                                                                                           1943
                                                                                                                                                                                   2480
                                                                                                                                                                                                                                                                                                                                                                                                                     2360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   2243
                                                                                                                                                                                                                                                                                                     2420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         2183
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1583
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           2123
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1523
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           2063
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1463
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             2003
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1403
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1943
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1343
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1883
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1283
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1763
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1703
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1643
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1583
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1523
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   986
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  926
                                                          밁
                                                                                                               8
                                                                                                                                                                          Дb
                                                                                                                                                                                                                        Ş
                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                    Ś
                                                                                                                                                                                                                                                                                                                                                                                                              멍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                   á
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    RESULT 10
US-09-624-693A-14
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            문
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Query Match 12.5%;
Best Local Similarity 54.2%;
Matches 719; Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Sequence 14, Application US/09624693A Patent No. 6355468 GENERAL INFORMATION:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       2184
      730
                                                                                                                                                                                612
                                                                                                                                                                                                                                       610
                                                                                                                                                                                                                                                                                                  552
                                                                                                                                                                                                                                                                                                                                                          550
                                                                                                                                                                                                                                                                                                                                                                                                                  492
                                                                                                                                                                                                                                                                                                                                                                                                                                                                         499
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   2772
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               2712
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      2124
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      2064
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    432
      ACCGGTCACCCCGACGTCAAGGTTCA---
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CAAGATGCTCGCGTA 2198
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CAAGATGATGGCATA 2786
---CGTTTTGCACGAGGGAACCGAGAAGATC 783
```

```
CACCAACGTCAGCCGCATCTACGAGGCGATCAAGAGCGGTTGCATCGCCCCCGTCCTCGT
                   GAGCAACGTCTCGCGCATCTACGAGGCCATCAAGGACGGCCGCATCAACCACGTCCTCGT
                                                      GGTCGGCGTCAAGGCCCGCCGCGGCGATGTCTACCTCGGCAAGCAGGAGGTCACGATCGG
                                                                           OCTCGGCGTGCAGGCGCCCCCGCGGCGACGTGTTTGTCGGCGTGCAGCAGGAGAGACGATCGG
                                                                                                                                                                     2123
 2771
                            2183
                                                        2711
                                                                                                                2651
                                                                                                                                           2063
                                                                                                                                                                      2591
```

APPLICANT: Yoshida, Roberta
APPLICANT: Yoshida, Roberta
APPLICANT: Yoshida, Roberta
TITLE OF INVENTION: Phenyllalanine Ammonia Lyase Polypeptide and
TITLE OF INVENTION: Polynuclectide Sequences and Methods of Obtaining and
TITLE OF INVENTION: Using Same
FILE REFERENCE: 29479/50NSC
CURRENT APPLICATION UNUMERS: US/09/624,693A
CURRENT FILING DATE: 2000-07-24
NUMBER OF SEQ ID NOS: 25
SOFTWARE: Patentin Ver. 2.0
SEQ ID NO 14
LENGTH: 2311
TYPE: DNA
ORGANISM: Amanita muscaria
FEATURE:
NAME/KEY: CDS
LOCATION: (18)..(2237)
US-09-624-693A-14

and

379 GTCTACGGAGTCACCACGGGTTTCGGTGGCTCGGCGACACGAGGACTGAGGATGCAGTC CGCGGCTCCATCTCGGCGTCGGGCGACCTCAGCCCGGCTCTCGTACATCGCCGGCGCCCATC 729 GTCGTCCTTGAGGCGCTCACCAACTTCTTGAACCACCGCATCACGCCCATCGTCCCCCTC CCTTTGGACGTCCTACCTCCAAGATGCAAATAACACAAGCATGCCAGAGGCGTGGATT TTGTTGGGGTTTGCCCTTTTGCAACACCAACATGTAGGGATACTGCCCACCTCGACTGAG GAGTTGATCGAAAAGATGAGAGAACTACTCGCGGCCAATGTGATACCTGTCGTTCCCCTG ĊĠĊĠĠĠĠĊĊĂŤŦŦŤĠĂŤĊĊĠŦAŤĠĂĂŦŤĊĠĊŤĄĂŦŦĊĠŦĠĠĊĊĂĊŤĊŦĠĠĄĄŤĊĄĠĄTĠĠ TCCTTCAGCGTCGGACGCGCCTCG-----AGAACACGCTTCCGCTCGAGGTCGTC Score 302.8; DB 4; Pred. No. 4.5e-50; 1; Mismatches 573; Indels Length 2311; ω ω • 671 611 551 549 431 491 498

```
밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ŋ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     당
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   မ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                ž
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          ႘
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Я
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     ¥
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             岁
                                                                                RESULT 11
US-09-615-192A-245
                                                                                                                                                                                                                                    Ş
                                                                                                                                                                                                                                                                                         В
                                                                                                                                                                                                                                                                                                                                        Ş
                                                                                                                                                                                                                                                                                                                                                                                                   g
                                                                                                                                                                                                                                                                                                                                                                                                                                               8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       맑
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ŋ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          ž
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Sequence 245, Application Patent No. 6410718 GENERAL INFORMATION:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1392
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1272
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1258
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1212
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1204
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1152
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1084
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1032
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1024
                                                                                                                                                                                                                                                                                              1620
                                                                                                                                                                                                                                                                                                                                              1618
                                                                                                                                                                                                                                                                                                                                                                                                   1560
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1505
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1438
                                                                                                                                                                                          1680
                                                                                                                                                                                                                                                                                                                                                                                                                                                       1558
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        964
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             912
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                TCGACTCTCTCGCTCGAG-----AACAACACGACGACGACAACCCGCTCCTCGACGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ccecrcecacerceccrcaerrecrceeccecrcereaaeaacareareaceccrae
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          GAGCACGAGGAGGAGGTCAAGGTCAAGGACGACGACGAGGCATTCTTCGCCAGGACCGCTAC 1143
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               GGTCAAGTAGAATGTGCTGAGAACATTTGGAATTTGCTCGATGGGAGTAAATTGGCTCAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    GGCCAGGTCGAGGTCGCGCCAACATCCGCACGCTCCTTTCCGGCTCGTCGTTTGCCGTT 1083
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      TTGATAGGCACTCGCGCTTCTCATGCACCGTTCATTCATGCCACCGCACCACCACCACCCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             ATGGTCGGCCAGGAGGGTTCGTTCGCGCGCCGTTCATCCACGACGTCTGCCGCGCGCACCCC 1023
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          AACGAAGCTATCCATCTTGTCTTGGCTCAAGTGTGCACGGCTATGGGGACCGAGGCA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               CACGACTCGCACATGCTCTCGCTCTCGCAGGCCTTGACGGCTCTCACGGTGGAGGCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    ĠAACCTĊTTĠĠŢAŤTTŤĠĀĀTĠĠĠĀĊĊĠĊAŤĊŤĊĠĠĊĀŤĊTĢŤĠĠĊĀGĊTTŤAGCCĊTĀ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                GAGGGTCTCGGTCTGGTCAACGGAACGGCCGTCTCCGCCTCGATGGCGACCCTCAGTCTG 903
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        GGATCCTCGAAGGATGTCTTGGCTCTGCATAATATCGAACCTTTCCCACTGGAATCGAAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             ATGITTGCGCGCGAGGCCATCTCGCTCTTTGGTCTCGAGGCAGTCGTCCTCGGCCCGAAG 843
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             GAGAAGACCAGGCTCGCACTCGCCCTCATCGGCAAGCTCAACTTCACGCAGTGCACCGAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    GAGAACAAGCAGACCGCGCACGGCGGCAACTTCCAGGCGTCGGCTGTCTCGATTTTCGATG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CCACTCCGAACTTCGCCTCAATTCCTTGGGCCTCAGATTGAAGACATAATCTCCGCTTTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           TTAGAAGAGCACGAAGTTCGCCTAGAAGACGATAAATACACCCTTCGGCAGGACCGTTAT 1151
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CTCAACTATCACGGCAAGGGCTTGGACATTCACATCGCTGCTTACGCTTCGGAGCTCGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ĠĀĠĀĀĠĀĊĠĊĠĀĊŢŢĠĊŢŢĬĄĊAŢĊĀĊĠŤŢĠĠĊĀĀĄŢĬĄCŢĄŤŢŢŢĊĊĊĀĠĀĠĊĀĊŢĠĀĄ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GAGACTGGCGAATCTCACCACGGTGGCAATTTCCAAGCGATGGCTGTAACTAATGCAATG
                                                                                                                                                                                       GAGTTC
                                                                                                                                                                                                                                            GACTIC 1683
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 CTCAACTACCACGCCAAAGGACTAGACATAGCAACTGCGGCCTACGTAGCCGA-----
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          TTAGTCAATCCTGCGATGAACCGCGGTCTGCCGCCTTCAGTAGCTGCCACAGATCCATCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               CTGATCGCGTCTTACTTGTATATTCTATGCCAAGCTCTCGACCTCCGTGCCCTTCAGCGC
                                                                                                                                                                                                                                                                                                                                              сттепевестевськоствтьствоеменного выстременного выпуска по применения применен
                                                                                                                                                                                                                                                                                                                                                                                                     AACTCCCTGGCGTTGATTTCTGCTCGGGCTACCATCACATCGTTGGAAGTGCTAACATCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                       AACTCGCTCGCTCTCATCTCCGCGCGCGCGCACTGCCGAGGCCAACGACGTCCTTTCTCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            ----AGCGACTCCTGGCCCCACTCACATTCAGTCGGCAGAAATGCACAACCAAGCTGTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CACCTTGCCAACCCGGTCACTACCTTCGTCCAGCCCGCAGAGATGGGCCAACCAGGCCGTC
                                                                                                                                                                                          1685
                                                          US/09615192A
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1451
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1391
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1377
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1211
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1203
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1031
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   971
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       911
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1271
                                                                                                                                                                                                                                                                                                                                                         1677
                                                                                                                                                                                                                                                                                                       1679
                                                                                                                                                                                                                                                                                              Ş
                                                                                                                                                                                                                                                                                                                                                                                                   Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                             멍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     멼
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     δ
                                                                                      Š
                                                                                                                                                                                     δ
                                                                                                                                                                                                                                               망
                                                                                                                                                                                                                                                                                                                                                      맑
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Query Match
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     598
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       635
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      478
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 364
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        304
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          359
                                                                                                                                                                                                                                                                                                                                                                                                                                                                569
```

```
FILE REFERENCE: 11000.1003c4U
CURRENT APPLICATION NUMBER: US/09/615,192A
CURRENT FILING DATE: 2000-07-12
PRIOR APPLICATION NUMBER: US 08/975,316
PRIOR APPLICATION NUMBER: US 08/713,000
PRIOR FILING DATE: 1997-11-21
PRIOR FILING DATE: 1996-09-11
PRIOR PILING DATE: 1996-09-11
PRIOR APPLICATION NUMBER: US 09/169,789
PRIOR APPLICATION NUMBER: US 09/169,789
PRIOR FILING DATE: 1998-10-09
NUMBER OF SEQ ID NOS: 405
SEQ ID NO 245
SEQ ID NO 245
LENGTH: 1455
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ; TYPE: DNA
; ORGANISM: Eucalyptus grandis
US-09-615-192A-245
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Best Local Similarity 52.4 Matches 623; Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                APPLICANT: Bloksberg, Leonard N.
APPLICANT: Havukkala, Ilkka
TITLE OF INVENTION: Materials and Methods for the
TITLE OF INVENTION: Modification of Plant Lignin (
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           184 CAGCTCGAGATCGTGCAGGAGCTCCTCAGCGACCCCACCGACGACGTCGTCGAGCTCAGC
                                                                                                                                                                                                                                                                                                                                       ATCGTCCCCTCCGCGCGCTCCATCTCGGCGTCGGGGGGACCTCAGCCCGCTCTCGTACATC
                                                                                                                                                                                                                                                                                                                                                                                                                             CAATCCTCCACCCGAGCCGCCATGCTCGTCCGGGTCAACACCCTCCTCCAGGGCTACTCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CGGAGGACGAAGGCAAGGCGTGCTTTGCAGAAGGAACTTATAAGGTTCTTGAATGCCGG-
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          GTCGAGCTCTCGGAGGCGGCCCGTCCCAGGGTCAAGGCCAGCAGCGACTGGGTCATGGAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             GTCCAGAACGACGAGGATCCGCGCACGCGTCGACAAGAGCGTCGACTTCCTCAAGGCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            ĠĠĠĠĀĠŦĊĊĊŢĊĀĊĠĀŢĀĠĊĊĊĀĠĠŢĠĠĊĠĠĊĠĠŢĠĠĊĠĀĠŦĊĀĠĠĀĠ---ĠĠĠĠĨĀĠĠĠ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      gggracheccricaccereacgricines caccececaaagaccacaagagicacaa
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          chccrcchccaaeereaadeceeareerceaeedeeracceeaeecceeceececrccecc
                                         CCGAAGGACTCTCGGTCTGGTCAACGGAACGGCCGTCTCCGCCTCGATGGCGACCCTC
                                                                                                                                                                                                                                         gcceeccarcaceaceaceaceaceaceaceaceaceaceaceaceaeceaeceae
                                                                                                                                                                                                                                                                                                                                                                                           GGCATCCGTTTTGAGATCCTCGAGGCCATCACCAAGTTCCTCAACCACAACATCACCCCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       crosaesrcerccececcearesrcarcecercaacrosecreacecerescence
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       GTGACGCCGACGTCCGTCCTTCAGCGTCGGACGCCGCCTCGAGAACACGCTTCCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              AGCATGAACAAGGGAACTGACAGCTACGGGGTCACCACCGGGTTCGGCGCCACTTCTCAC
CCAAAGGAAGGGTTGGCGCTCGTGAACGGCACGGCAGTCGGGTCTGGCCTGGCTTCCATC
                                                                                             CTGGACGCTGTCGAGGCCTTCCGGCTCGCCGGGATTGACACGGGCTTCTTCGAGCTGCAG
                                                                                                                                                                                             ĠĊĊĠĠĠĊŢĊĊŢĠĂĊĠĠĠĊĊĠĠĊĊĊĀĂĊŢĊĊĀĀĠĠ---CĊĠŢĊĠĠĠĊĊŢĠĀŢĠĠĠĀAGŢĊĊ
                                                                                                                                                                                                                                                                                             recerececercaeeeecaecareaerecereaeeeeaerreereceeererecaearr
                                                                                                                                            AAGATCATGTTTGCGCGCGAGGCCATCTCGCTCTTTGGTCTCGAGGCAGTCGTCCTCGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           ------GATCTTCGGCAACGGCACGGAGTCGTGCCACACCTGCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              52.4%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Score 207.2; DB 4;
Pred. No. 1.4e-31;
0; Mismatches 528;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Content
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               39;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   303
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     363
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 358
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  417
                                                                                                                                                                                                                                                                                                                                                                                                                                                    657
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  597
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   634
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   594
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     477
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      535
                                                         897
                                                                                                                                                                                                                                                      777
                                                                                                                                                                                                                                                                                                        814
                                                                                                                                                                                                                                                                                                                                                    717
                                                                                                                                                                                                                                                                                                                                                                                                     754
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      694
                                                                                                       931
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               6
```

```
APPLICANT: Bloksberg, Leonard N.
APPLICANT: Havukkala Ilkka
TITLE OF INVENTION: Materials and Methods for
TITLE OF INVENTION: Modification of Plant Lig
FILE REFERENCE: 11000.1003c4U
CURRENT APPLICATION NUMBER: US/09/615,192A
CURRENT FILING DATE: 2000-07-12
PRIOR APPLICATION NUMBER: US 08/975,316
PRIOR APPLICATION NUMBER: US 08/713,000
PRIOR FILING DATE: 1997-11-21
PRIOR APPLICATION NUMBER: US 08/713,000
PRIOR FILING DATE: 1996-09-11
PRIOR APPLICATION NUMBER: US 09/169,789
PRIOR FILING DATE: 1998-10-09
PRIOR FILING DATE: 1998-10-09
PRIOR FILING DATE: 1998-10-09
                                            Ş
                                                                                                                                                      Ş
                                                                                                      망
                                                                                                                                                                                                                   B
                                                                                                                                                                                                                                                                         Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               RESULT 12
US-09-615-192A-247
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        뭐
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ъ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         SEQ ID NO 247
LENGTH: 1520
                                                                                                                                                                                                                                                                                                                                            Matches
                                                                                                                                                                                                                                                                                                                                                                                                         Query Match
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Sequence 247, Application US/09615192A Patent No. 6410718 GENERAL INFORMATION:
                                                                                                                                                                                                                                                                                                                                                                                                                                                            TYPE: DNA
ORGANISM: Pinus
-09-615-192A-247
                                                                                                                                                                                                                                                                                                                                                                            Local Similarity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1286
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1138
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1109
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1018
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1052
                                            958
                                                                                                         201
                                                                                                                                                                                                                            141
                                                                                                                                                                                                                                                            838 CCGAAGGAGGGTCTCGGTCTGGTCAACGGAACGGCCGTCTCCGCCTCGATGGCGACCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1078 GCCGTTGAGCACGAGGAGGACGTCAAGGTCAAGGACGACGAGGCATTCTTCGCCAGGAC
                                                                                                                                                                                                                                                                                                                                            469;
      GAGGCCATGGTCGGCCAGCAGGGCTCGTTCGCCGCCGTTCATCCACCGACGTCTGCCGCCCG 1017
                                                                                               GTGTGTTTCGATGCCAATGTTCTTGCTCTGCTCTGAAGTAATCTCTGCCATGTTCTGC
                                                                                                                                                         AGTCTGCACGACTCGCACATGCTCTCGCTCTCGCAGGCCTTGACGGCTCTCACGGTG
                                                                                                                                                                                                                   CCTAAAGAAGGTCTGGCCATTGTCAATGGCACTTCAGTGGGAGCAGCACTGGCTTCCATT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  FastSEQ for Windows
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           GAGAAGACCAGGCTCGCACTCGCCCTCATCGGCAAGCTCAACTTCACGCA 1367
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GACAACACTCGCCTGGCGGTTGCGTCCATAGGGAAGCTCATGTTCGCGCA 1455
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GAGAACAAGCAGACCGCGCACGGCGCAACTTCCAGGCGTCGGCTGTCTCGATTTCGATG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               GCAACCAAGATGATTGAGAGGGAAATCAATTCGGTCAATGACAACCCGCTGATCGATGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  AGGTACGCTCTCAGGACTTCTCCCCAGTGGCTAGGGCCCCAGATTGAGGTGATCCGAGCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CGCTACCCGCTCGCACGTCGCCTCAGTTCCTCGGCCCCCCTCGTGGAGGACATGATGCAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        TACGTGAĂGGCTĞCTAAAAAĞTTGCACGAGATGGATCCGCTCCAGAAGCCAAAGCAĞGAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CATCCCGGGCAGATTGAGTCTGCGGCTATAATGGA----GCACATTTTGGATGGAAGCGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     ĠĀĠĠĪĠĀĪĠĊĀĠĠĠĀĀĠĊĊĠĠĀĠŤĪĊĀĊĀĠĀĊĊĄĊŤſĠĀĊĠĊĀTĀĀAŢŢĠĀĀĠĊĄĊ---
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GTCCTCTTCGAGGCCAACATACTCGCGGTCCTGTCCGAGGTCCTGTCAGCGATCTTCGCA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        GCCTACTCGACTCTCGCTCGAGAACAACACGACGACCAACCCGCTCCTCGACGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CACCCCGGCCAGGTCGAGGTCGCGCCAACATCCGCACGCTCCTTTCCGGCTCGTCTTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        GAGGCCATGGTCGGCCAGCAGGCTCGTTCGTCGCGCGTTCATCCACGACGTCTGCCGCCCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    AGTCTGCACGACTCGCACATGCTCTCGCTCCTCGCAGGCCTTGACGGCTCTCACGGTG
                                                                                                                                                                                                                                                                                                                                            Conservative
                                                                                                                                                                                                                                                                                                                                                                      7.0%;
                                                                                                                                                                                                                                                                                                                                            0
                                                                                                                                                                                                                                                                                                                                         Score 168.6; DB 4;
Pred. No. 4.1e-24;
0; Mismatches 434;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Version 3.0
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            for the
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Content
                                                                                                                                                                                                                                                                                                                                            Indels
                                                                                                                                                                                                                                                                                                                                                                                                  Length
                                                                                                                                                                                                                                                                                                                                      10;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1317
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1345
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1197
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1165
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1077
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1017
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1051
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1225
                                                                                                                                                                                                                                                                                                                                                                                                                                                                               RESULT 13
US-09-252-991A-16475
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            맑
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        맑
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               맑
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 뮹
APPLICANT: Marc J. Rubenfield et al.
TITLE OF INVENTION: NUCLEIC ACID AND AMINO ACID SEQUENCES RELATING TO
TITLE OF INVENTION: AERIGINOSA FOR DIAGNOSTICS AND THERAPEUTICS
FILE REFERENCE: 107196.136
CURRENT FILING DATE: 1999-02-18
PRIOR APPLICATION NUMBER: US 60/074,786
PRIOR APPLICATION NUMBER: US 60/074,786
PRIOR FILING DATE: 1998-07-27
NUMBER OF SEQ ID NOS: 33142
SEQ ID NO 16475
LENGTH: 1548
                                                                                                                                                                                                                                                                                                                                                                                               GENERAL INFORMATION:
                                                                                                                                                                                                                                                                                                                                                                                                                      Sequence 16475, Application US/09252991A Patent No. 6551795
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1735
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1615
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1495
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1435
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1378
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1318
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1258
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1198
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1138
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1078 GCCGTTGAGCACGAGGAGGACGTCAAGGTCAAGGACGACGAGGGCATTCTTCGCCAGGAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     734
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        674
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  614
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        554
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           494
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  434
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               ACAGGGCTCAACG 1046
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  ACTGGCCTCGACG 1747
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               GANAACATGCTGGCCACTGTGAAGCAGATTGTTTCTCAGGTAGCCAAGAAAACCCCTGAGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CTCGACTTCAAGAAGCAGTTCGACCCGCTTCTCCCGACTCTCCTCCAGCAGCACCTCGGC 1739
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CTCCTTCTCGCCTCGCACCTGTACTGCACGCTCCAGGCCGTCGACCTCCGCGCGATGGAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GTCAATTCTCTGGGTCTCGTTTCAGCTAGAAAATCTGCCGAGGCCATCGATATTCTGAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               ercaacroscroscrorororos 161
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CTTTACCTGGCAAATCCTGTCACCAGCCATGTACAGAGCGCCGAACAGCATAACCAGGAT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GGCCACCTTGCCAACCCGGTCACTACCTTCGTCCAGCCCGCAGAGATGGGCAACCAGGCC 155
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           TCGCTCAACTATCACGGCAAGGGCTTGGACATTCACATCGCTGCTTACGCTTCGGAGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           TIGCICAACGCIGCCATGAACCGCGGCCTGCCTTCGTGCCTGCCGAG---GACCCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              eccracrosacrororos en academica de la constante de la constant
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CTGATGCTCTCCACATACCTGACAGCTCTGTGCCAGGCTGTGGATTTAAGGCATCTGGAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               AGCCTGGATTATGGACTGAAAGGGGCCGAGATCGCTATGGCTTCTTACACTTCTGAGCTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           GATAATCTTCGTCTGTCAATTTCAGCAATTGGGAAATTGATGTTCGCTCAATTCTCAGAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           GAGAACAAGCAGACCGCGCACGGCGAACTTCCAGGCGTCGGCTGTCTCGATTTCGATG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 TATATGAAACACGCTGCTAAGCTCCATGAGATGAATCCTCTGCAGAAGCCAAAGCAGGAT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CACCCGGCCAGGTCGAGGTCGCGCGAACATCCGCACGCTCCTTTCCGGCTCGTCGTTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CTTGTGAATGATTACTACAATGGAGGCTTGCCTTCGAATCTGAGTGGTGGGCCTAATCCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GAGAAGACCAGGCTCGCACTCGCCCTCATCGGCAAGCTCAACTTCACGCAGTGCACCGAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GCCAGAGACAAAGCTCTACATGGAGGGAATTTCCAGGGCACACCTATTGGTGTTTCCATG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CGCTATGCGCTTCGCACTTCGCCTCAGTGGCTCGGCCCTCAGGTGGAGATTATCAGATCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     cectacececrecacerecerecerecerecececececerecae
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           GAGGTTATGAATGGGAAGCCTGAGTTTACAGATCCATTAACTCACAAGCTGAAGCAC---
```

973

853

1494

793

733

1377

613

673

1317

1257

553

493

1137

433

1077

373

PSEUDOMONAS

```
밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    망
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      융
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          ႘
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             ž
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Я
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            ž
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            문
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Ķ
                                                                                                           S
                                                                                                                                                                           뮍
                                                                                                                                                                                                                               Ś
                                                                                                                                                                                                                                                                                               В
                                                                                                                                                                                                                                                                                                                                                S
                                                                                                                                                                                                                                                                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         ž
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           ž
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Я
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ϋ́
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         ; TYPE: DNA
; ORGANISM: Pseudomonas aeruginosa
JS-09-252-991A-16475
Ş
                                                          8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Best Local Similarity Matches 571; Conserv
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Query Match
Best Local S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1176
                                                                                                                                                                                                                                        1356
                                                                                                                                                                                                                                                                                               1089
                                                                                                                                                                                                                                                                                                                                                      1296
                                                                                                                                                                                                                                                                                                                                                                                                                    1029
                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1236
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1116
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1056
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    873
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  813
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        693
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               876
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      633
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          591
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  756
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            531
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             471
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    636
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            351
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  969
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   924
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         996
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    753
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              936
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             CGGCCTCGAGAACACGCTTCCGCTCGAGGTCGTCGCGGGGGGCGATGGTCATCCGGGTCAA 575
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      сатссасваситствессвессевсь в поставовной в поставовном в по
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           GGCCTTGACGGCTCACGGTGGAGGCCATCGTCGGCCAGCAGGGCTCGTTCGCGCCCGTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GTCCACCGCCTACGCGCGCGGGGTTGTTCGAGGCCGAGGACCTGTTCGCCGCCGCCAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GCTGGAGCCGCTGACCCTGGCGGCGAAGGAAGGCCTGGCCCTGCTCAATGGCACCCAGGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CGTTTTGCACGAGGGAACCGAGAAGATCATGTTTGCGCGCGAGGCCATCTCGCTCTTTGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   CCTCAGCCCGCTCTCGTACATCGCCGGCGCCATCACCGGTCACCCCGACGTCAAGGTTCA 755
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CTTGAACCACCGCATCACGCCCATCGTCCCCTCCGCGGCTCCATCTCGGCGTCGGCGA 695
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CAGCCTGGCGCGCGTTCTCCGGCATCCGCCAAGGTGATCGACGCGCTGATCGCGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CGGCGTCGGCGAGGCGCCACGCCATGGTGCGGCTGGTCATGCTGCTCAAGGTGAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CGTCTGCGGCGGGCTCAGCGTCGAGGCCATGCTCGGTTCGCGGGCGCCGTTCGATGCGCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          ceere-
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CCTGGCGCCCCTGGCGCACATGTCGCTGGTGCTGATCGGCGAAAAGCCGGGGGGCGCCATCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               CGACAACCCCGCTCCGACGAGAACAACAAGCAGACCGCGCACGGCGGCAACTTCCAGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CGAGGGCATTCTTCGCCAGGACCGCTACCCGCTCCGCACGTCGCCTCAGTTCCTCGGCCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        GCTCCTTTCCGGCTCGTCGTTTGCCGTTGAGCACGAGGAGGAGGTCAAGGTCAAGGACGA 1115
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CATCCATGCCGCGCGGCGAGCGTGGGCAGATCGACGTGGCCGCGGCCTATCGCGACCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CTCCGCCTCGATGGCGACCCTCAGTCTGCACGACTCGCACATGCTCTCGCTCTCGCA 935
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       TCTCGAGGCAGTCGTCCTCGGCCCGAAGGAGGGTCTCGGTCTGGTCAACGGAACGGCCGT
                                                                                                           CCTCGCTGCCGAGGACCCGTCGCTCAACTATCACGGCAAGGGCTTGGACATTCACATCGC
                                                                                                                                                                                                                                                                                                                                                      GTCGGCTGTCTCGATTCGATGGAGAAGACCAGGCTCGCACTCGCCCTCATCGGCAAGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CTGCCTGACCCAGATGCGCCAGGCCGAGGTGCTGGAGATCGAAGCCCAACGCGGTGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      ĠĊTĊACCGĊĊAĠĊAGCGAĞGTGĞĊGCGCTCCCATGAGAAGTGCGACAAGGT------
      TGCTTACGCTTCGGAGCTCGGCCACCTTGCCAACCCGGTCACTACCTTCGTCCAGCCCGC
                                                             GTTCCTGGTGGCCAACGGCGGGTCAACTCCGGCTTCATGATCGCCCAGGTCACCGCCGC
                                                                                                                                                                                                                                     CGAACCGGTGGCGATGGCCGACCAACCTGGCCCTGGCGTTGGCCGAGATCGGTTCGC-
                                                                                                                                                                                                                                                                                                                                                                                                                CGACAACCCGCTGGTATTCGCCGCCGAGGGCGACGTGATCTCCGGCGGCAACTTCCACGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Conservative
                                                                                                                                                                              - TGTCGGAACGGCGCATCTCGCTGATGATGGACATGCACATGTCGCAGTTGCCGCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   47.1%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           <u>,,</u>
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Score 126.8; DB 4;
Pred. No. 5.1e-16;
0; Mismatches 592;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              AGTGGCTGCCGGCCGAAGCGCTGGCGGTGGCCGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Length 1548;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 49;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                530
            1535
                                                                                                                          1475
                                                                                                                                                                                    1202
                                                                                                                                                                                                                                                                                                                                                         1355
                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1295
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1235
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1175
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1055
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     815
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               590
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              470
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   410
                                                                                                                                                                                                                                                                                                                                                                                                                       1088
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1028
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            872
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          812
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      875
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              632
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      968
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              4
```

```
APPLICANT: Marc J. Rubenfield et al.
APPLICANT: Marc J. Rubenfield et al.
TITLE OF INVENTION: NUCLEIC ACID AND ACID SEQUENCES RELATING TO E
TITLE OF INVENTION: AERUGINOSA FOR DIAGNOSTICS AND THERAPEUTICS
FILE REFERENCE: 107196.136
CURRENT APPLICATION NUMBER: US/09/252,991A
CURRENT FILING DATE: 1999-02-18
PRIOR APPLICATION NUMBER: US 60/074,788
PRIOR APPLICATION NUMBER: US 60/094,190
PRIOR FILING DATE: 1998-02-18
PRIOR FILING DATE: 1998-07-27
NUMBER OF SEQ ID NOS: 33142
SEQ ID NO 16126
LENGTH: 2295
TYPE: DNA
ORGANISM: Pseudomonas aeruginosa
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         RESULT 14
US-09-252-991A-16126/c
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 片
                                                                               Š
                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                              Ş
                                                                                                                                                                                                                                                                                                                                                                            멼
                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     US-09-252-991A-16126
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Sequence 16126, Application US/09252991A Patent No. 6551795
GENERAL INFORMATION:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Query Match
Best Local
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Local Similarity
nes 571; Conserv
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1263
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1168
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1048
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1108
    826
                                                                                                                                                                                                                                                                                                                                                                                      928
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              988
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             516
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                756
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CGCGCTGGCCAGCGACAACAAGGCCCTGGCCCATCCGGCCAGCGTCGACACACCTGCCGAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   GGCCAACGACGTCCTTTCTC-TCCTTCTCGCCTCGCACCTGTACTGCACGCTCCAGGCCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           GCGACAAGGTGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      TCCTCCAGCAGC 1726
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                TGGACTTCCGCGAGGGCCTGAAGAGTTCGCCGAAGCTGGAGCAGGCTCGCCGCCTGCTGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         TCGACCTCCGCGCGATGGAGCTCGACTTCAAGAAGCAGTTCGACCCGCTTCTCCCGACTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CTCGGCCAACCAGGAAGACCATGTCGATGGCGCCGAACGCCGGCAAACGGCTCTGGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       crigaaccaccaricaceccarcerccrecrecrecressicaricres
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CAGCCTGGCGCGCGTTCTCCGGCATCCGCCGCAAGGTGATCGACGCGCTGATCGCGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      croscroacecerescroseceresceresceres contrated accessors and contrated accessors accessors and contrated accessors and contrate
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   concercos de la concentración de la concentrac
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GTCCACCGCCTACGCGCCGCGGGTTGTTCGAGGCCGAGGACCTGTTCGCCGCCGCCAC
                                                                                                                                                                                        TCTCGAGGCAGTCGTCCTCGGCCCGAAGGAGGGTCTCGGTCTGGTCAACGGAACGGCCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CCTCAGCCCGCTCTCGTACATCGCCGGCGCCATCACCGGTCACCCCGACGTCAAGGTTCA
                                                                                         CTCCGCCTCGATGGCGACCCTCAGTCTGCACGACTCGCACATGCTCTCGCTCCTCGCA
                                                                                                                                                                                                                                                                                                                                                                                      cggrg-
                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CGTTTTGCACGAGGGAACCGAGAAGATCATGTTTGCGCGCGAGGCCATCTCGCTCTTTGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CCTGGCGCCGCTGGCGCACATGTCGCTGGTGCTGATCGGCGAAAGCCCGGGCGCCATCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  5.2%;
ilarity 47.1%;
Conservative C
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1514
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Score 126.8; DB 4; Length Pred. No. 5.4e-16; 0; Mismatches 592; Indels
                                                                                                                                                                                                                                                                                                                                                                                           AGTGGCTGCCGGCCGAAGCGCTGGCGGTGGCCGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Length 2295;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      49;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ö
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        PSEUDOMONAS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1442
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1654
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1382
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1322
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            575
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1049
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1109
                                                                                                             935
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       755
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 989
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                695
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    635
                   767
                                                                                                                                                                                                                                                                                                      875
                                                                                                                                                                                                                                                                                                                                                                                                887
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               815
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             929
                                                                                                                                                                                                       827
```

```
RESULT 15
US-09-489-039A-6404
                                                                                                                                                                                                                                                                                   日
                                                                                                                                                                                                                                                                                                             δ
                                                                                                                                                                                                                                                                                                                                                  g
                                                                                                                                                                                                                                                                                                                                                                           Š
                                                                                                                                                                                                                                                                                                                                                                                                                    DЬ
                                                                                                                                                                                                                                                                                                                                                                                                                                              γQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ğ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     $
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           뫄
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            g
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            D<sub>D</sub>
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               멍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ş
                                                                                                                                             Sequence 6404, Application US/09489039A
PATENT NO. 6610836
GENERAL INFORMATION:
APPLICANT: Gary Breton et. al
SEQ ID NO
            APPLICANT: Gary Breton et. al
TITLE OF INVENTION: NUCLEIC AGID AND AMINO ACID
TITLE OF INVENTION: PREUMONIAE FOR DIAGNOSTICS A
FILE REFERENCE: 2709.2004001
CURRENT APPLICATION NUMBER: US/09/489,039A
CURRENT FILING DATE: 2000-01-27
PRIOR APPLICATION NUMBER: US 60/117,747
PRIOR APPLICATION NUMBER: US 60/117,747
PRIOR FILING DATE: 1999-01-29
PRIOR FILING DATE: 1999-01-29
PRIOR SEQ ID NOS: 14342
                                                                                                                                                                                                                                                                                                                   1715
                                                                                                                                                                                                                                                                                                                                                                                    1655
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1536
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1476
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1416
                                                                                                                                                                                                                                                                                                                                                                                                                                                     1596
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1356
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1296
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1236
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1176
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1116
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1056
                                                                                                                                                                                                                                                                                                                                                                                                                      136
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     196
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        316
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         371
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          430
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            490
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           550
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                646
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               706
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 766
 6404
                                                                                                                                                                                                                                                                                   16
                                                                                                                                                                                                                                                                                                                                                    76
                                                                                                                                                                                                                                                                                   GCGACAAGGTGC
                                                                                                                                                                                                                                                                                                                   TCCTCCAGCAGC 1726
                                                                                                                                                                                                                                                                                                                                                                               TCGACCTCCGCGCGATGGAGCTCGACTTCAAGAAGCAGTTCGACCCGCTTCTCCCGACTC
                                                                                                                                                                                                                                                                                                                                                                                                                                             GCCAACGACGICCTTICTC-TCCTTCTCGCCTCGCACCTGTACTGCACGCTCCAGGCCG
                                                                                                                                                                                                                                                                                                                                                                                                                  GATGGCCGAGAACGTCCCGCGGGATTCTCGCCGTGGAGTCGCTGGGCCCTGCCAGGGCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CTCGGCCAACCAGGAAGACCATGTGTCGATGGCGCCGAACGCCGGCAAACGGCTCTGGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 CGCGCTGGCCAGCGACAACAAGGCCCTGGCCCATCCGGCCAGCGTCGACAGCCTGCCGAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   TGCTTACGCTTCGGAGCTCGGCCACCTTGCCAACCCGGTCACTACCTTCGTCCAGCCCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    GTTCCTGGTGGCCAACGGCGGGTCAACTCCGGCTTCATGATCGCCCAGGTCACCGCCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      CCTCGCTGCCGAGGACCCGTCGCTCAACTATCACGGCAAGGGCTTGGACATTCACATCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    саасттсасесаетесассваеттестсаасстессательнососвесствесттеств
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CGAACCGGTGGCGATGGCCGACAACCTGGCCCTGGCGTTGGCCGAGATCGGTTCGC-
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        TGGACTTCCGCGAGGGCCTGAAGAGTTCGCCGAAGCTGGAGCAGGCTCGCCGCCTGCTGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GTCGGCTGTCTCGATTTCGATGGAGAGAGCCAGGCTCGCACTCGCCCTCATCGGCAAGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      CGACAACCCGCTGGTATTCGCCGCCGAGGGCGACGTGATCTCCGGCGGCAACTTCCACGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CGAGGGCATTCTTCGCCAGGACCGCTACCCGCTCCCCACGTCCACGTTCCTCGGCCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    ----TGTCGGAACGGCGCATCTCGCTGATGATGGACATGCACATGTCGCAGTTGCCGCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CGACAACCCGCTCCTCGACGTCGAGAACAAGCAGACCGCGCAACGGCGCGAACTTCCAGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CTGCCTGACCCAGATGCGCCAGGCCGCCGAGGTGCTGGAGATCGAAGCCCAACGCGGTGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          GCTCACCGCCAGCAGCGAGGTGGCGCGCCCCATGAGAAGTGCGACAAGGT------
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          GCTCCTTTCCGGCTCGTCGTTTGCCGTTGAGCACGAGGAGGAGGAGGTCAAGGTCAAGGACGA 1115
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CATCCATGCCGCGCGGCCAGCGTGGCCAGATCGACGTGGCCGCGGCCTATCGCGACCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             CATCCACGACGTCTGCCGCCCGCACCCCGGCCAGGTCGAGGTCGCGCGCAACATCCGCAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               CGTCTGCGGCGGGCTCAGCGTCGAGGCCATGCTCGGTTCGCGGGCGCCGTTCGATGCGCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             egcciteacegcicicacegreeaegccaregicegccaegcaegccicericegcccccciri
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         - CCAGGACCCCTATTCGCTGCGTTGCCAGCCGCAGGTGATGGGCGC
                                                                                                               AND
                                                                                                               SEQUENCES RELATING TO KLEBSIELLA AND THERAPEUTICS
                                                                                                                                                                                                                                                                                                                                                  17
                                                                                                                                                                                                                                                                                                                                                                                                                                                  1654
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1535
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1415
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1355
                                                                                                                                                                                                                                                                                                                                                                                                                77
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     197
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1475
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      317
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1295
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    257
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       372
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1235
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1175
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1055
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        431
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        491
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         551
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            596
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             995
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            647
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             707
```

```
Ş
                                                      밁
                                                                             Ś
                                                                                                        밁
                                                                                                                                  Ś
                                                                                                                                                                 Вþ
밁
                                                                                                                                                                                     5
                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                              Š
                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                     Ş
                                                                                                                                                                                                                                                                                                                                   뫄
                                                                                                                                                                                                                                                                                                                                                      . 8
                                                                                                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                                                                                                 Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         よ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ; TYPE: DNA; CRGANISM: Klebsiella US-09-489-039A-6404
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Query Match
Best Local Sim
Matches 405;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   LENGTH: 1527
TYPE: DNA
1000
                                                                                1237
                                                                                                                                      1177
                                                                                                                                                                                                                                                 1057
                                                                                                                                                                                           1117
                                                                                                          880
                                                                                                                                                                                                                                                                                                        997
                                                                                                                                                                                                                       784
                                                                                                                                                                                                                                                                             724
                                                                                                                                                                                                                                                                                                                                   664
                                                                                                                                                                                                                                                                                                                                                              937
                                                                                                                                                                                                                                                                                                                                                                                        604
                                                                                                                                                                                                                                                                                                                                                                                                                    877
                                                                                                                                                                                                                                                                                                                                                                                                                                              544
                                                                                                                                                                                                                                                                                                                                                                                                                                                                         817
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     499
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         439
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     697
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                379
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             577
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             757
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           637
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      319
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             259
Similarity
                       TCGGCTGTCTCGATTTCGATGGAGAGAGACCAGGCTCGCACTCGCCCTCATCGGCAAGCTC
                                                                               GACAACCCGCTCCTCGACGTCGAGAACAAGCAGACCGCGCACCGCGGCAACTTCCAGGCG
                                                                                                         GATAACCCGCTGGTCTTTGCCGCCGAAAATGACGTCATCTCCGGCGGTAACTTCCATGCC
                                                                                                                                   GAGGGCATTCTTCGCCAGGACCGCTACCCGCTCCGCACGTCGCCTCAGTTCCTCGGCCCG
                                                                                                                                                                                                                       CTGACCGACGATAGCGCGATCTCGCAGCACCATAACTGCAGCAAGGT-
                                                                                                                                                                                                                                                CTCCTTTCCGGCTCGTCGTTTGCCGTTGAGCACGAGGAGGAGGAGGTCAAGGTCAAGGACGAC
                                                                                                                                                                                                                                                                          ATCCATGAAGTGCGCGGCCAGCGCGGCAGATTGATGCGGCGCGCCGCTATCGCCACCTG
                                                                                                                                                                                                                                                                                                      ATCCACGACGTCTGCCGCCGCCACCCCGGCCAGGTCGAGGTCGCGCGCAACATCCGCACG
                                                                                                                                                                                                                                                                                                                                   GTCTGCGGGGCGTTAACCACCGAAGCGGCGCTGGGCTCACGTCCGTTTGATGCGCGC
                                                                                                                                                                                                                                                                                                                                                            GCCTTGACGGCTCTCACGGTGGAGGCCATGGTCGGCCAGCAGGGCTCGTTCGCGCCGTTC
                                                                                                                                                                                                                                                                                                                                                                                       TCGACCGCTTTTGCCCTGCGCGGTCTGTTCGAAGCCGAGGATCTGTTCGCCTCCGCGGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                             CTGGAGCCGATTACCCTTGGCGCGAAAAGAGGGGCCTGGCGCTACTCAACGGCACCCAGGCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GTGAATGCCGGTGTGACGCCGTGGATCCCGGCCAAAGGCTCCGTCGGCGCCTCCGGCGAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    AGCCTGTCCCGCGGTTTCTCCGGGATCCGCCTGAGCGTGATCCAGGCGCTGATTGGCCTG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               TCGCTCACGCGTGGCCACTCGGCCGTCGCCTCGTCCTTGAGGCGCTCACCAACTTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          GGCGTTGGCGAGCCGCTGGACGATGATCTGGCGCGGCTGATTATGGTGCTGAAGATTAAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                       GTTTTGCACGAGGGAACCGAGAAGATCATGTTTGCGCGCGAGGCCATCTCGCTCTTTGGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CTCGCGCCGCTGGCGCATATGTCGCTGACCCTGATCGGAGAAGGTAAAGCGCGGGTACGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CTCAGCCCGCTCTCGTACATCGCCGGCGCCATCACCGGTCACCCCGACGTCAAGGTTCAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GGCCTCGAGAACACGCTTCCGCTCGAGGTCGTCCGCGCGCCATGGTCATCCGCGTCAAC
                                                                                                                                                                                                                                                                                                                                                                                                                 TCCGCCTCGATGGCGACCCTCAGTCTGCACGACTCGCACATGCTCTCGCTCTCTCGCAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       TIGAACCACCGCATCACGCCCATCGTCCCCCTCCGCGGCTCCATCTCGGCGTCGGGCGAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      pneumoniae
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              48.2%;
                                                                                                                                                                 -GCAGGACCCGTACTCCCTGCGCTGCCAGCCGCAGGTGATGGGCGCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 0
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Score 108.4; DB 4
Pred. No. 1.9e-12;
0; Mismatches 396
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   TGCCGGCCACCGAAGCGCTGCGTCAGGTGGGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             DB 4;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  396;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 39;
                     1356
                                                                                                                                                                                          1176
                                                                                                                                                                                                                                                 1116
                                                                                                                                                                                                                                                                                                        1056
                                                    999
                                                                                1296
                                                                                                         939
                                                                                                                                     1236
                                                                                                                                                                 879
                                                                                                                                                                                                                                                                                                                                                                                        663
                                                                                                                                                                                                                     833
                                                                                                                                                                                                                                                                                                                                   723
                                                                                                                                                                                                                                                                                                                                                              996
                                                                                                                                                                                                                                                                                                                                                                                                                  936
                                                                                                                                                                                                                                                                                                                                                                                                                                             603
                                                                                                                                                                                                                                                                                                                                                                                                                                                                         876
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             816
                                                                                                                                                                                                                                                                          783
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   543
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         498
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              438
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          969
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    378
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               636
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      576
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  756
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              2
```

Search completed: September 12, 2004, 04:26:43
Job time: 190.4 secs

```
Result
No.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Post-processing: Minimum Match 0%
Maximum Match 100%
Listing first 45 summaries
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Minimum DB seq length: 0
Maximum DB seq length: 2000000000
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Sequence:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Title:
Perfect score:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Run
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Searched:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Scoring table:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    DM nucleic - nucleic search, using sw model
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Total number of hits satisfying chosen parameters:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 9
                                                                                                                                                                                                                                                                                                                                                            Pred. No. is the number of results predicted by chance to have a score greater than or equal to the score of the result being printed, and is derived by analysis of the total score distribution.
               1196.6
1196.6
1195
1195
1195
                                                                                                                                          1629
1196.6
1196.6
                                                                                                                                                                                                  2418.6
1826.6
1704
                                                                                                                                                                                                                                                                         Score
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      US-09-939-408A-12
2419
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           3304383 seqs, 2515761380 residues
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               IDENTITY_NUC
Gapop 10.0 , Gapext 1.0
10:
111:
122:
144:
155:
166:
187:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            September 11, 2004, 23:12:54; Search time 1570.32 Seconds (without alignments) 7750.794 Million cell updates/sec
                                                                                                                                                                                                                                                                       Query
Match Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Copyright
                                                                                                                                                                                                                                                                                                                                                                                                                                     / Cgn2_6/ptodata/1/pubpna/US09E_PUBCOMB.seq:*
/ Cgn2_6/ptodata/1/pubpna/US09C_PUBCOMB.seq:*
/ Cgn2_6/ptodata/1/pubpna/US09_NEW_PUB.seq:*
/ Cgn2_6/ptodata/1/pubpna/US09_NEW_PUB.seq:*
/ Cgn2_6/ptodata/1/pubpna/US10A_PUBCOMB.seq:*
/ Cgn2_6/ptodata/1/pubpna/US10B_PUBCOMB.seq:*
/ Cgn2_6/ptodata/1/pubpna/US10B_PUBCOMB.seq:*
/ Cgn2_6/ptodata/1/pubpna/US10_PUBCOMB.seq:*
/ Cgn2_6/ptodata/1/pubpna/US10_NEW_PUB.seq:*
/ Cgn2_6/ptodata/1/pubpna/US10_NEW_PUB.seq:*
/ Cgn2_6/ptodata/1/pubpna/US10_NEW_PUB.seq:*
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    /cgn2 6/ptodata/1/pubpna/US0
/cgn2-6/ptodata/1/pubpna/PCT
/cgn2-6/ptodata/1/pubpna/US0
2475
2151
2151
2151
2151
2151
2439
2151
2151
2151
2151
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         . 6/ptodata/1/pubpna/PCT NEW PUB.seq:*
6/ptodata/1/pubpna/US06_NEW PUB.seq:*
1-6/ptodata/1/pubpna/US06_PUBCONB.seq:*
-6/ptodata/1/pubpna/PCTUS_PUB.Seq:*
-6/ptodata/1/pubpna/PCTUS_PUBCONB.seq:*
-6/ptodata/1/pubpna/PCTUS_PUBCONB.seq:*
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        6/ptodata/1/pubpna/US09A
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             6/ptodata/1/pubpna/PCTUS_PUBCOMB.seq:*
6/ptodata/1/pubpna/US08_NEW_PUB.seq:*
6/ptodata/1/pubpna/US08_PUBCOMB.seq:*
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        GenCore version 5.1.6 (c) 1993 - 2004 Compugen Ltd.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         /ptodata/1/pubpna/US07_PUBCOMB.seq:*
                                                9 US-09-339-408A-12
9 US-09-339-408A-28
9 US-09-339-408A-29
9 US-09-339-408A-20
9 US-09-765-873A-9
15 US-10-138-970A-23
15 US-10-138-523B-9
16 US-10-374-366-3
17 US-10-374-366-3
18 US-09-765-873A-7
19 US-09-765-873A-7
15 US-10-188-523B-7
                                                                                                                                                                                                                                                                             BB
                                                                                                                                                                                                                                                                                                                                   SUMMARIES
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                PUBCOMB.seq:*
           Sequence 12, Appl
Sequence 28, Appl
Sequence 20, Appl
Sequence 20, Appl
Sequence 23, Appl
Sequence 23, Appl
Sequence 24, Appl
Sequence 27, Appl
Sequence 27, Appl
Sequence 7, Appl
Sequence 7, Appl
Sequence 7, Appl
Sequence 1, Appl
                                                                                                                                                                                                                                                                             Description
```

4 51	44	43	42	41	40	39	38	37	36	ω G	34	(L)	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15
			80.	82	82	38		$\sim$	00.	00.		01.	40	80		24.	54	96.	02.	36.	188.	188.	190.	90.	191.	193.	193.	193.	1193.4	19
4	14.5	5	S	5	ū	ŗ	ŗ	ō,	ď	<u>ი</u>	σ.	σ		ς.	.7	.7		œ	۳	.7	·	·	·		·	۳	۳.	۳	Ÿ	
Ų,	2145	w	0	9	W	7	Ψ	'n	4	4	41	4.5	Ñ	Ω	5	អ្ន	2	4	2	78	8	8	5	등	ᅜ	5	ᅜ	5	5	5
17	17	13	17	13	17	17	17	13	13	7	L U	13	17	17	13	17	15	17	16		ຫ		σ	16	16	16	16	76	16	16
0-437-963-3611	-10-437-963	-10-425-114-2857	-10-439-479-9	-10-425-114-133	0-437-963-4142	-10-437-963-3858	-10-437-963-4831	-10-425-114-2807	-10-425-114-3190	-10-425-114-3088	0-425-114-3119	-10-425-114-3412	-10-437-963-5526	S-10-767-701-1581	0-425-114-263	S-10-767-701-1581	0-138-970A-3	S-10-439-479-2	-10-439-478-1	-09-939-408A-1	-188-523B	-09-765-873A-31	3-10-374-366-1	-10-374-366-1	-10-374-366-1	-10-374-366-2	-10-374-366-1	-10-374-366-7	1-366-	-10-374-
equence serii,	quence	equence 2857, A	equence 9, Appr	equence 1334,	equence 41428,	equence 38582,	equence 48311,	equence 28070,	equence 31903,	equence 30888,	equence 31197,	equence 34124,	equence 55261,	equence 15813,	equence 26.	equence 15815,	equence 3, Appı	equence 24, AL	equence 1, Appi	quence 16, Appl	Sequence 31, Ap	quence 31, Appl	equence 19, App	equence 11, App	equence 1/, App	equence 21, App	equence 15, App	equence /, Appr	quence 5, Appi	equenc

## ALIGNMENTS

```
RESULT 1

US-09-039-408A-12
US-09-039-408A | Sequence 12, Application US/09939408A

Patent No. US2002012712A1

PATENT NO. US2002012712A1

APPLICANT: Yoshida, Roberta
TITLE OF INVENTION: Polynuclectide Sequences and Methods of Obtaining and
TITLE OF INVENTION: US 09/624,693

PRICE PRICE 1014 NUMBER: US 09/624,693

PRICE APPLICATION NUMBER: US 09/624,693

PRICE PRICE PATE: 2001-09-24

PRICE FILING DATE: 2001-07-24

PRICE FILING DATE: 2001-07-24

PRICE FILING DATE: 2001-07-24

PRICE FILING DATE: 2001-07-24

NUMBER OF SEQ ID NOS: 30

SOFTWARE: Patentin Ver. 2.0.

SEQ ID NO 12

LENGTH: 2419

TYPE: DNA
ORGANISM: Rhodotorula graminis

FEATURE:
NAME/KEY: CDS
LOCATION: (493)...(2196)

NAME/KEY: modified_base
LOCATION: (493)...(495)

COTHER INFORMATION: Other information: Y = t or c

NAME/KEY: unsure
LOCATION: (493)...(495)

COTHER INFORMATION: Other information: Xaa = Val or Ala

US-09-939-408A-12

Query Match
Matches 2419; Conservative 0; Mismatches 0; Indels 0; Gaps 0;
```

,	B 성	B 8	90	음 성	Db 99	g Q	g V	B 8	B 8	B 8	유 성	оу Оъ	Qy b	g 64	9g 4g	4g 4g	P 9	D Q
	1021 CCCGGCCAGTCGAGGTCGCGCGCAACATCCGCACGCTCCTTTCCGGCTCGTCGTTTGCC 1080	961 GCCATGGTCGGCCAGCAGGGCTCGTTCGCGCCGTTCATCCACGACGTCTGCCGCCGCAC 1020	901 CTGCACGACTCGCACATGCTCTCGCTCCTCGCAGGCCTTGACGGCTCTCACGGTGGAG 960	841 AAGGAGGGTCTCGGTCTGGTCAACGGAACGGCCGTCTCCGCCTCGATGGCGACCCTCAGT 900	781 ATCATGTTTGCGCGCGAGGCCATCTCGCTCTTTGGTCTCGAGGCAGTCGTCCTCGGCCCG 840	721 GGCGCCATCACCGGTCACCCCGACGTCAAGGTTCACGTTTTGCACGAGGAACCGAGAAC 780	661 GTCCCCCTCGGCGGCTCCATCTCGGCGTCGGGCGACCTCAGCCCGCTCTCGTACATCGCC 720	601 GTCCGCCTCGTCGTCCTTGAGGCGCTCACCCAACTTCTTGAACCACCGCATCACGCCCATC 660	541 GAGGTCGTCGCGGGCCCATGGTCATCCGCGTCAACTCGCTCACGCGTGGCCACTCGGCC 600	481 ACGCCGACGTCCGYCTCGTCCTTCAGCGTCGGACGGCCTCGAGGAACACGCTTCCGGCTC 540	421 AGGACTGAGGATGCAGTCAGCCTCCAGAAGGCGCTCATCGAGCACCAGCTCTGCGGCGTG 480	361 GCCCAGCTTCAGAACTCGGTCTACGGAGTCACCACGGGTTTCGGTGGCTCGGCCGACACG 420 	301 CGCGTCCAGAACGACGACGAGGATCCGCGCACGCGTCGACAAGAGGGGTCGACTTCCTCAAG 360 	241 AGCGGTACAGCCTCACCGTCCGTGACGTTGTCGGCGCCCGCAAGGGGCGCAGGGTC 300	181 TCGCAGCTCGAGATCGTGCAGGAGCTCCTCAGCGACCCACCGACGACGTCGTCGAGCTC 240	ccgcgcaccag 1	DACGCTCGCCAACGGCTTTACCAACGGCTCGCACGCCTCCGACCAAGTCGGCT	1 CTCCTGCCTCACTCTAACCCGTCACTAGCACTCGCGATGGCCCCTTCCTT
VQ VQ	dg Vo	מם עס	y Qy	dd Yo	dd Qy	Qy da	dd do	da Yo	da Yo	QY dd	dd dd	da עס	da da	Db	da עס	, da	Qy Db	Db Qy
2161 GGCCGCATCAACCACGTCCTCGTCAAGATGCTCGCGTAAGGCCCGAGCAAGCCTCGCCTA 2220	2101 GGCGTGCAGCAGGACGACGATCGGGAGCAACGTCTCGCGCATCTACGAGGCCATCAAGGAC 2160		981	1921 1921	1861 GTCGTCGAGCTCCTCCGTCCTCGCCCTCTGCCAACGCCTTACTGCCGTCAACGCG	1801	1741 1741	1681 1681	1621 1621	1561 1561	1501	1441 1441	1381 1381	Y 1321 AAGACCAGGCTCGCACTCGCCCTCATCGGCAACTCAACT	1261 1261	1201	y 1141 TACCCGCTCCGCACGTCGCCTCAGTTCCTCGGCCCGCTCGTGGAGGACATGATGCACGCC	Y 1081 GTTGAGCACGAGGAGGAGGTCAAGGTCAAGGACGACGAGGGATTCTTCGCCAGGACCGC

В 9

Ś 片 Ś В Ş

```
Sequence 28, Application US/09939408A
Patent No. US20020102712A1
GENERAL INFORMATION:
APPLICANT: Yoshida, Roberta
APPLICANT: KOOTSTRA, Anna
TITLE OF INVENTION: Polynucleotide Sequences and Methods of Obtain:
TITLE OF INVENTION: Polynucleotide Sequences and Methods of Obtain:
TITLE OF INVENTION: Using Same
FILE OF INVENTION: Using Same
FILE OF INVENTION UNMBER: US/09/939,408A
CURRENT APPLICATION NUMBER: US/09/939,408A
CURRENT FILING DATE: 2001-08-24
PRIOR APPLICATION NUMBER: US/09/624,693
PRIOR APPLICATION NUMBER: US/09/6
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  RESULT 2
US-09-939-408A-28
                                                           LOCATION: (1)..(361)
OTHER INFORMATION:
NAME/KEY: terminator
LOCATION: (2587)..(2589)
OTHER INFORMATION:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               NAME/KEY: exon
LOCATION: (2008)..(2586)
OTHER INFORMATION:
NAME/KEY: exon
LOCATION: (1822)..(1947)
OTHER INFORMATION:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    FEATURE:
NAME/KEY: modified_base
LOCATION: (6)
OTHER INFORMATION: Description of modified_base: m =
                                                                                                                                                                                                                                                                                                            LOCATION: (961)..(1295)
OTHER INFORMATION:
NAME/KEY: exon
                                                                                                                                                                                                                      LOCATION: (449)..(880)
OTHER INFORMATION:
NAME/KEY: exon
                                                                                                                                                                                                                                                                                                                                                                                                                                         NAME/KEY: exon
LOCATION: (1365)..(1529)
OTHER INFORMATION:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   NAME/KEY: exon
LOCATION: (1587)..(1748)
                                                                                                                                                                                                                                                                                                                                                                                                           NAME/KEY: exon
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            OTHER INFORMATION:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       2401
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      2341
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              2341
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            2281
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        2281
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   2221
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  2221
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             2161
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CCCGCGTCTCTCGGTCGTCAGTACACGTGTATAGAGCCTGGAATGGATTGCAAGTCTTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GACGCCCGCCTCACCCCAAGACCAGCTTTTCGACGTCGTGTCGTGCCAAGAACGGACTTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             GGCCGCATCAACCACGTCCTCGTCAAGATGCTCGCGTAAGGCCCGAGCAAGCCTCGCCTA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                AGTTCAAAAAAAAAAAAA 2419
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      CCCGCGTCTCTCGGTCGTCAGTACACGTGTATAGAGCCTGGAATGGATTGCAAGTCTTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CCTCCATACACATGTCGCCTTACTCTCGCCGTCATCACGTCTCTCAGTTCTTTCGTAT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CCTCCATACACATGTCGCCTTACTCTCTCGCCGTCATCACGTCTCTCAGTTCTTTCGTAT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               AGTTCAAAAAAAAAAAA 2419
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          (1948)..(2007)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Obtaining
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         2400
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    2400
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                2340
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           2340
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          2280
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     2280
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    2220
                                                              Ş
                                                                                                                                                                                     Š
                                                                                                                                                                                                                                                                                                        Ş
                                                                                                                                                                                                                                                                                                                                                                                    B
                                                                                                                                                                                                                                                                                                                                                                                                                                         S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        멍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   US-09-939-408A-28
                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Query Match
Best Local Similarity
Matches 2312; Conserv
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      NAME/KEY: Intron
LOCATION: (1749)..(1821)
OTHER INFORMATION:
NAME/KEY: Intron
LOCATION: (1530)..(1586)
OTHER INFORMATION:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          NAME/KEY: Intron
LOCATION: (362)..(448)
OTHER INFORMATION:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       NAME/KEY: Intron
LOCATION: (881)..(960)
OTHER INFORMATION:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                NAME/KEY: Intron
LOCATION: (1296)..(1364)
OTHER INFORMATION:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  OTHER INFORMATION:
                                                                                                                                                                                                                                                                                                                                                                                                                                                   490
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  481
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                430
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            421
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       396
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     396
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        337
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     277
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         217
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      157
                                                                                                                                                                                                  610
                                                                                                                                                                                                                                                              601
                                                                                                                                                                                                                                                                                                                            550
                                                                                                                                                                                                                                                                                                                                                                                        541
             721
                                                                                                                                   661
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                97
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   37 ATGGCCCCTTCCTTGGACTCGCTCGCCACCACGCTCGCCAACGGCTTTACCAACGGCTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     61 CACGCCGCTCCGACCAAGTCGGCTGCGGGCCCCACTTCGGCTCTCCGCCGCACGCCCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1 Aresemberrocarresable action of the contract of the contract
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      GATGCAGTCAGCCTCCAGAAGGCGCTCATCGAGCACCAGCTCTGCGGCGTGACGCCGACG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               GTGCGTTCCGAGACGAGAGGCGGAAATCTCGGGATGCCGCAGCGCTGAACGCTGACACTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    GACAAGAGCGTCGACTTCCTCAAGGCCCAGCTTCAGAACTCGGTCTACGGAGTCACCAC- 395
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   GCCGCCCGCAAGGGGCGCAGGGTCCGCGTCCAGAACGACGAGGAGATCCGCGCACGCGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            GCCGCCCGCAAGGGGCGCAGGGTCCGCGTCCAGAACGACGACGAGATCCGCGCACGCGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             cccacceaceacercerceaecreaeceeracaecercaccercereacerrerceec
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      cccaccgacgacgregregagcreagcgggracagccreaccgregacgregacgregacgc
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CTCGATGGCCACGCGCACCAGTCGCAGCTCGAGATCGTGCAGGAGCTCCTCAGCGAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               CTCGATGGCCACGCCGCGCACCAGTCGCAGCTCGAGAGATCGTGCAGGAGCTCCTCAGCGAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             GTCGTCCTTGAGGCGCTCACCAACTTCTTGAACCACCGCATCACGCCCATCGTCCCCCTC
                                                                                                                                                                                                                                                                                                                                                                                        recererecireadecireciaecereciaedecereciaedesecricesecreciaecireciae
                                                                                                                                                                                                                                                                                                                                                                                                                               TCCGYCTCGTCCTTCAGCGTCGGACGCGGCCTCGAGAACACGCTTCCGCTCGAGGTCGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GATGCAGTCAGCCTCCAGAAGGCGCTCATCGAGCACCAGCTCTGCGGCGTGACGCCGACG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            GCTTGGACGGCTGCCGCGGTCTTGCAGGGTTTCGGTGGCTCGGCCGACACGAGGACTGAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    GACAAGAGCGTCGACTTCCTCAAGGCCCCAGCTTCAGAACTCGGTCTACGGAGTCACCACG
                                                                                                                                                                                                                                                                                               CGCGGCGCATGGTCATCCGCGTCAACTCGCTCACGCGTGGCCACTCGGCCGTCGCCTC
                                                                 свсевстссятстсвесетовеесвасстсявсссестстсятасятся свесессятс
                                                                                                                                   ercercerreaecececenacerrerreaaceaececarcacececarececece
                                                                                                                                                                                                                                                              CGCGGCGCATGGTCATCCGCGTCAACTCGCTCACGCGTGGCCACTCGGCCGTCCGCCTC
             CGCGGCTCCATCTCGGCGTCGGGCGACCTCAGCCCGCTCTCGTACATCGCCGGCGCCCATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   75.5%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      ; Score 1826.6; pred. No. 0; 2; Mismatches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    DB 9;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Indels 426;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Length 2741;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              429
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     395
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   276
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  60
                   780
                                                                                                                                                                                                                                                                                                                                609
                                                                                                                                                                                                                                                                                                                                                                                                                                                          549
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       489
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            336
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 180
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          216
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        120
                                                                               729
                                                                                                                                          720
                                                                                                                                                                                                         669
                                                                                                                                                                                                                                                                    660
                                                                                                                                                                                                                                                                                                                                                                                           600
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            <u>σ</u>
```

1424 CCGAGGACCGGTCGACTATCACGGCAAGGGCTTGGACATTCACATTCGCTTACG 1483	730 ACCGGTCACCCCGACGTCAAGGTTAAGGTTTTGCACGAGGGAACCGAGAAGAGTCATGTTTT 789 781 ACCGGTCACCCCGACGTCAAGGTTCACGTTTTGCACGAGGGAACCGAGAAGATCATGTTT 789 782 GGGCGCGAGGCCATCCCCTCTTTGGTCTCAAGGCAGCCAGTCCGAGAAGATCATGTTT 789 841 GGGCGCGAGCCATCCGCTCTTTGGTCTGAAGGCAGTCGAGAACGACCGAGAAGATCATGTTC 828 841 GGGCGCGAAGGCCATTCGCTCTTGGTCTGAAGGCAGTCGAGACGACCCTCGATGCACC 829 901 GCATGAGCTGTCGAGAGGTTTGGTCTGAAGGCAACGACCGCTTCCTCCACCCTCGATGGAGCAGCCTCTGATGCAACGACGACCCTCGATGGAGCAGAGCAACGACCGCTTCAAGGAACGACCCTCGATGGAGGAGCAGAGCAACGACCGCTTCAAGGAACGACCCTCCTAAGGATTCAAGGAACGACCACTCTAAGAGTCTAAGAGCAACGACCACCTCGATTGCAACGAACG
RESULT US-09- Seque Pate APP APP APP TIT TIT TIT FIL CURI	8
RESULT 3 US-09-339-408A-29 ; Sequence 29, Application US/09939408A ; Patent No. US20020102712A1 ; Patent No. US20020102712A1 ; Patent No. US20020102712A1 ; Patent No. US20020102712A1 ; APPLICANT: Yoshida, Roberta ; APPLICANT: Yoshida, Roberta ; TITLE OF INVENTION: Phenylalanine Ammonia Lyase Polypeptide and ; TITLE OF INVENTION: Dolynucleotide Sequences and Methods of Obtaining and ; TITLE OF INVENTION: Using Same ; FILE REFERENCE: 29479/500NSCA ; CURRENT APPLICATION NUMBER: US/09/939,408A	1531 CCGCCAGAGATGGGCCACCCCCCTCATCTCCGCCCCCCCC

장

유 성 유

8 8 8

B 55 B

8 B

8 8

상 유

8 8

Ş

용 성

50 A

장 유

\$ B

8 8 8

```
CURRENT FILING DATE: 2001-08-24
PRIOR APPLICATION NUMBER: US 09/624,693
PRIOR FILING DATE: 2000-07-24
PRIOR APPLICATION NUMBER: PCT/US01/23270
PRIOR FILING DATE: 2001-07-24
NUMBER OF SEQ ID NOS: 30
SOFTWARE: Patentin Ver. 2.0
SEQ ID NO 29
LENGTH: 2163
                                                                                                                                                                                                                                                                                                                                                                                                                                         В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                           뮍
                                                                    Ş
                                                                                                 밁
                                                                                                                      Ş
                                                                                                                                                  밁
                                                                                                                                                                                Ś
                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                     Ş
                                                                                                                                                                                                                                                                      밁
                                                                                                                                                                                                                                                                                               Š
                                                                                                                                                                                                                                                                                                                         B
                                                                                                                                                                                                                                                                                                                                                     8
                                                                                                                                                                                                                                                                                                                                                                                  B
                                                                                                                                                                                                                                                                                                                                                                                                       8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                맑
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ; NAME/KEY: CDS
; LOCATION: (1)..(2163)
; OTHER INFORMATION:
US-09-939-408A-29
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Query Match
Best Local S
Matches 1817
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       LENGTH: 2163
TYPE: DNA
ORGANISM: Artificial Sequence
FEATURE:
OTHER INFORMATION: Description of Artificial Sequence: Preferred
OTHER INFORMATION: theoretical sequence based in part on SEQ ID NO:20
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            y Match, DB 9, 70.4%; Score 1704; DB 9; Local Similarity 84.0%; Pred, No. 0; nes 1817; Conservative 109; Mismatches 236;
                                                                                                                                                                                                                                          517
                                                                                                                                                                                                                                                                                                                            361
                                                                                                                                                                                                                                                                                                                                                         397
                                                                                                                                                                                                                                                                                                                                                                                    301
                                                                                                                                                                                                                                                                                                                                                                                                             337
                                                                                                                                                                                                                                                                                                                                                                                                                                           241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                      277
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           217
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  157
                757
                                                                       697
                                                                                                                            637
                                                                                                                                                        541
                                                                                                                                                                                     577
                                                                                                                                                                                                                 481
                                                                                                                                                                                                                                                                      421
                                                                                                                                                                                                                                                                                                 457
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          97
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 37
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CACGCCGCTCCGHCCAAGYCGSCWACGGGCGCCACGTCCACHCTCWGMCGGCCGGCCGGCCDGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    ATGGCCCTTCCTTGGACTCGCTCGCCACCGCTCGCCAACGGCTTTACCAACGGCTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                        GCCGCCGCAAGGGGCGCAGGGTCCGCGTCCAGAACGACGACGAGGATCCGCGCACGCGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               CCCACCGACGACGTCGAGCTCAGCGGGTACAGCCTCACCGTCGGTGACGTTGTCGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CACGCCGCTCCGACCAAGTCGGCTGCGGGGCCCCACTTCGGCTCTCCGCCGCCACGCCCGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ATGGCCCCCTCCBTCGACTCGATCGCGATCGCGATCGCCAACGGCBTCDCVAACGGVTHG
                                                                                                                                                                                                                                                                                     ATCGAGCACCAGCTCTGCGGGGTGACGCCGACGTCCGYCTCGTCCTTCAGCGTCGGACGC
                                                                                                                                                                                                                                                                                                                                             GGTTTCGGTGGCTCGGCCGACACGAGGACTGAGGATGCAGTCAGCCTCCAGAAGGCGCTC
                                                                                                                                                                                                                                                                                                                                                                                                    GACAAGAGCGTCGACTTCCTCAAGGCCCAGCTTCAGAACTCGGTCTACGGAGTCACCACG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CTCGATGGCCACGCGCGCACCAGTCGCAGCTCGAGATCGTGCAGGAGCTCCTCAGCGAC
GTTTTGCACGAGGGGAACCGAGAGATCATGTTTGCGCGCGAGGCCATCTCTCTTTGGT
                                         CTCAGCCCGCTCTCGTACATCGCCGGCGCCATCACCGGTCACCCCGACGTCAAGGTTCAC
                                                                                                                   TTGAACCACCGCATCACGCCCATCGTCCCCCTCCGCGCCTCCATCTCGGGCGTCGGGCAC
                                                                                                                                                        TCGCTCACBCGCGGCCACTCGGCBGTCCGCCTCGTCGTCCTCGAGGCGCTCACCAACTTC
                                                                                                                                                                          TCGCTCACGCGTGGCCACTCGGCCGTCCGTCGTCGTCCTTGAGGGCGCTCACCAACTTC
                                                                                                                                                                                                                                                                     CTCGAGCACCAGCTCTGCGGTGTBCTCCCBACGTCGDTCGABTCCTTCVGCCTCGGHCGC
                                                                                                                                                                                                                                                                                                                               GGTTTCGGCGGCTCGGCCGACACCCGGACTGAGGATGCVATCTCGCTCCAGAAGGCBCTC
                                                                                                                                                                                                                                                                                                                                                                                     GACAAVAGBGTCGAGTTCCTCCGBDCBCAGCTCBACAACAGBGTCTACGGHGTCACGACT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CCCACCGACGACGWSVTCGAACTCGACGGGTACACCCTCACCCTCGGHGACGTCGTCGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CTCGCTCCTCCCGCCACCCAGVHGACGCAGCTCGACATCGTBGAGVAGATCCTCGCCGAC
                                                                                                   CTCAACCACGCATCACCCCCATCGTCCCCCTCCGCGCACCATCTCGGCGTCGGGCGAC
                                                                                                                                                                                                                 GCCTCGAGAACTCGCTTCCGCTCGAGGTCGTCCGCGGCGCCATGACCATCCGCGTCAAC
                                                                                                                                                                                                                                          GCCTCGAGAACACGCTTCCGCTCGAGGTCGTCCGCGGCGCCATGGTCATCCGCGTCAAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Length 2163;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             0,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            156
                                                                                                                                                                                                                                                                                                  516
                                                                                                                                                                                                                                                                                                                                                           456
                                                                                                                                                                                                                                                                                                                                                                                                                                           300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                       336
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            276
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          180
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   216
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        60
                                                                                                                                                          600
                                                                                                                                                                                     636
                                                                                                                                                                                                                 540
                                                                                                                                                                                                                                          576
                                                                                                                                                                                                                                                                         480
                                                                                                                                                                                                                                                                                                                             420
                                                                                                                                                                                                                                                                                                                                                                                     360
                   816
                                                                        756
                                                                                                    660
                                                                                                                               696
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ş
                         Ş
                                                   B
                                                                                δ
                                                                                                                B
                                                                                                                                     Ś
                                                                                                                                                                   뫄
                                                                                                                                                                                               δ
                                                                                                                                                                                                                                В
                                                                                                                                                                                                                                                   Ş
                                                                                                                                                                                                                                                                                     망
                                                                                                                                                                                                                                                                                                           S
                                                                                                                                                                                                                                                                                                                                         망
                                                                                                                                                                                                                                                                                                                                                                  Ś
                                                                                                                                                                                                                                                                                                                                                                                                 D,
                                                                                                                                                                                                                                                                                                                                                                                                                      S
                                                                                                                                                                                                                                                                                                                                                                                                                                                       В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          먑
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1081
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1201
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1141
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1117
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1021
                                1837
                                                            1741
                                                                                       1777
                                                                                                                  1681
                                                                                                                                            1717
                                                                                                                                                                         1621
                                                                                                                                                                                                      1657
                                                                                                                                                                                                                                 1561
                                                                                                                                                                                                                                                          1597
                                                                                                                                                                                                                                                                                      1501
                                                                                                                                                                                                                                                                                                                 1537
                                                                                                                                                                                                                                                                                                                                            1441
                                                                                                                                                                                                                                                                                                                                                                        1477
                                                                                                                                                                                                                                                                                                                                                                                                   1381
                                                                                                                                                                                                                                                                                                                                                                                                                             1417
                                                                                                                                                                                                                                                                                                                                                                                                                                                          1321
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1261
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1297
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1237
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  961
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            997
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              841
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       901
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   937
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          721
                                                                                                                                                                                                                                                                                     CTCGCTGCCGAGGACCCGTCGCTCAACTATCACGGCAAGGGCTTGGACATTCACATCGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                          AACTTCACGCAGCTCACCGAGATGCTCAACGCCGGCATGAACCGCGGCCTBCCBTCCTGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                             DCCGCTGTCGCVAACACGATGGAGAAGACTCGCCTCGCVCTCGCCCTGATCGGCAAGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        TCGGCTGTCTCGATTTCGATGGAGAAAGACCAGGCTCGCACTCGCCCTCATCGGCAAGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GACAACCGGCTCCTCGAGACGTCGAGAACAAGCAGACCGCGCACGGGGGGAACTTCCAGGCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                GAGGGCATTCTCCGCCAGGACCGCTACCCGCTCCGCACGTCGCCTCAGTGGCTCGGCCCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       GAGGGCATTCTTCGCCAGGACCGCTACCCCGCTCCGCACGTCGCCTCAGTTCCTCGGCCCG 1176
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CTCCTCAAGGGCAGCHVGTTTGCCGTCCACCACGAGGAGGAGGTCAAGGTCAAGGTCAAGGACGAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CTCCACGACGTCACGCGCCCTCACCCGACCCAGATCGAGGTCGCGCGCAACATCCGCACG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ATCCACGACGTCTGCCGCCCGCACCCCGGCCAGGTCGAGGTCGCGCAACATCCGCACG 1056
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         ececrcaceecrorsaceerceaeeccareerceeccacecceecrocarrocacccvrrc
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       GCCTTGACGGCTCTCACGGTGGAGGCCATGGTCGGCCAGCAGGGCTCGTTCGCGCCGTTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              TCCGCCTCGATGGCGACCCTCGCTCTGCACGACGCACATGCTCTCGCTCCTCGCAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    TCCGCCTCGATGGCGACCCCTCAGTCTGCACGACTCGCACATGCTCTCGCTCTCTCGCAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CTCGAGCCCGTCCTCGGCCCGAAGGAGGGTCTCGGTCTCAACGGCACGGCCGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             CTCGAGGCAGTCGTCCTCGGCCCGAAGGAGGGTCTCGGTCTGGTCAACGGAACGGCCGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            GTYKTSCACGAGGCAMSGAGAAGATCATGTHCGCCCGCGAGGCGATCGCGCTCTTBGGT
                                                                          GCGCTCAACAAGCGTCTCGAGCAGACGACGACGTACGACCTCGAGCCGCGCTGGCACGAC
                                                                                                                                                                                            GACCTCCGCGCGATGGAGCTCGACCTTCAAGAAGCAGTTCGACCCGCTTCTCCCGACTCTC
                                                                                                                                                                                                                                GCCAACGACGTCCTTTCTCTCCTCCTCCCACCCACCTCTACTGCGTBCTCCAGGCCGTC
                                                                                                                                                                                                                                                      GCCAACGACGTCCTTCTCCTTCTCGCCTCGCACCTGTACTGCACGCTCCAGGCCGTC
                                                                                                                                                                                                                                                                                                                                               GCBTACACTTCGGAGCTCGGHCACCTTGCCAACCCGGTBACGACCCACGTCCAGCCGGCH
                                                                                                                                                                                                                                                                                                                                                               GCTTACGCTTCGGAGCTCGGCCACCTTGCCAACCCGGTCACCTTCGTCCAGCCCGCA
                                                                                                                                                                                                                                                                                                                                                                                                    GACAACCCGCTCATCGACGTCGAGAACAAGAHGACCCACCACGGCGGCAACTTCCAGGCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CTCGTCAGCGACATGATTCACGCCCACGCBGTCCTCTCGCTCGAGGCCGAGTCGACGACCACC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CICCITICCGGCTCGTTTGCCGTTGAGCACGAGGAGGAGGTCAAGGTCAAGGACGAC 1116
                                                                                                                   HTCVAGCAGCACTTTGGCDCYGCCCTCGACGGCWACGAACTCGHGGACAAGGTCAACAAG
                                                                                                                                 GACCTCCGCGCGATGGAGTTCGAGTTCAAGAAGCAGTTCGACCCGVTBVTCVCBDCGCTC
                                GCCTTCTCGTACGCGACCGGCACCGTCGTCGAGCTCCTCTCGTCCTCGCCCTCTGCCAAC 1896
                                                            pcecrepacaaeceserredaecaeaeceaecreeraeeaecreeaeceaeceaeceae
       decrireredirededadeddedaeddiedredaderecreredreeredeesycroceaad
        1860
                                                                                          1836
                                                                                                                                                                                                                                                                                                                    1596
                                                                                                                                                                                                                                                                                                                                                                           1536
                                                                                                                                                                                                                                                                                                                                                                                                       1440
                                                                                                                                                                                                                                                                                                                                                                                                                                1476
                                                                                                                                                                                                                                                                                                                                                                                                                                                             1380
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1416
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1320
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1356
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1080
                                                               1800
                                                                                                                                               1776
                                                                                                                                                                            1680
                                                                                                                                                                                                                                    1620
                                                                                                                                                                                                                                                             1656
                                                                                                                                                                                                                                                                                         1560
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1260
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           960
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      996
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 900
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            936
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        840
```

	QY 155 GCCTCGATGGCCACGCGCGCACCAGCTCGAGATCGTGCAGGAGCTCCTCAGCG 214	OY 97 CACGCCGCTCCGACCAAGTCGGCTGCGGGCCCCACTTCGGCTCTCCGCCGCACGCCCG 154	QY 37 AIGGCCCCTTCCTIGGACTCGCTCGCCAACGCTCGCCAACGGCTTTACCAACGGCTCG 96	Query Match 67.3%; Score 1629; DB 9; Length 2475; Best Local Similarity 78.0%; Pred. No. 0; Matches 1878; Conservative 1; Mismatches 504; Indels 25; Gaps 8;	(C)	erence 2475) n = A or C or G or T. "n" indicates no consensus at that		SOFTWARE: SEQ ID NO 2	; PRIOR FILING DATE: 2000-07-24 ; PRIOR APPLICATION NUMBER: PCT/US01/23270 ; PRIOR FILING DATE: 2001-07-24 ; NUMBER OF SEO ID NOS: 30	CURRENT APPLICATION NUMBER: US/09/939,408A CURRENT FILING DATE: 2001-08-24 PRIOR APPLICATION NUMBER: US 09/624,693	VENTION: Polynucleotic VENTION: Using Same INCE: 29479/500NSCA	rosniqa, koberta Kootstra, Anna WENTION: Phenylalanine Ammonia Lyase	ICE 20, Application US: No. US20020102712A1 LINFORMATION:	RESULT 4 US-09-939-408A-20	Db 2161 TA 2162	197 ТА 2198	QY 2137 CGCATCTACGAGGCCATCAAGGACGGCCGCATCAACGTCCTCGTCAAGATGCTCGCG 2196	Py 2077 GUGUGUGACGACGTETTTGTCGGCGTGCAGCAGGACGATCGGGAGCAACGTCTCG 2136	1981 TACCTCTCGCCGCGCACGCGCGTCCTGTACTCGTTCGTCCGCGAGGAGCTCGGCGTCAAG	CCCCGCACGCGCGTCCTGTACTCGTTCGTGCGCGAAGAAGCTCGGCGTGCAG	Qy 1957 ACGCGCGAGGTGCGCAACCGCTTCTGGCAGACGCCGTCTTCGCAGGCGCCGCGCGCACGCA	Db 1861 GTCTCGCTGGCGGCCGTCAACGCCTGGAAGGCTCCGCCGAGAAGGCCATCTCGCTC 1920	Qy 1897 GTCACCCTTACTGCCGTCAACGCCTGGAAGGTTGCCTCGGCCGAGAAGGCCATCTCGCTC 1956
γQ	94 55	B 5	S B 5	Q 09	D	\$ \$ ·	ο ο <sub>υ</sub>	γQ	Db Qy	D .	용	δ	Db Qy	Db 43	)   	. 8	Db 49	Db Db	9 1	g &	D	) E	ς δ
1288 TTCCAGGCGTCGGCTGTCTCGATTTCGATGGAGAAGACCAGGCTCGCACTCGCCCTCATC 1347	1228 ACGACCACCGACCGCCTCCTCGACACCGACAACAAGCAGCCGCCACGCGCACGCGCAAC 1287 	SCCCCGCTCGTCAGCGACATGATTCACGCCCACGCNGTCCTCTCGCTCGAGGGCCGGNCAG	GACGACGAGGGCATTCTCCGCCAGGACCGCTACCCGCTCCGCAGGTCGCCTCAGTTGCTCTC	GCACGCTCCTTCCGCTCGTCGTTGCCCTTGACCACGACGAGGAGGAGGTCAAGGTCAAGGTCAGGITGAGCACGTTCAGGTCAGG	P +	1 TOGORGO CONTOCONO CONTOC	841 GCCGTCTCCGCCTCGATGGCGACCCTCGCTCTGCACGACACACATGCTCTCGCTCCTC 900 931 TCGCAGGCCTTGACGGTCTCACGGTGGAGGCCATGGTCGGCCAGCAGCAGCTCGTTCGCG 990	871 GCCGTCTCCGCCTCGATGGCCGACCTTCAGTCTGCACGACTTCGCACATGCTCTCGCTCCTC 930	811 TTTGGTCTCGAGGCAGTCGTCCTCGGCCCGAAGGAGGGTCTCGGTCTAGCGGAACG 870		661 GGCGACCTCTCCCCCNCTCTCNTACATCGCCGCCGCCATCACCGGTCACCGGACNATCACGGGCACCATCACGGACNATCACGGGACNATCACGGGACNATCACGGGACNATCACGGGACNATCACGGGACNATCACGGGACNATCACGGACNATCACGGACNATCACGGACNATCACGGACNATCACGGACNATCACGGACNATCACGGACNATCACGGACNATCACGGACNATCACGGACNATCACGACACACACACACACACACACACACACACACACAC	691 GGCGACCTCAGCCCCGTCTCGTACATCGCCGGCGCCATCACCGGTCACCCCGACGTCAAG 750	631 AACTTCTTGAACCACGGATCACGCCCATCGTCCCCCTCCGCGGCTCCATCTCGGCGTCG 690	541 GTCAACTCGCTCACNCGCGGCCACTCGGCNGTCCGCCTCGTCGTCCTCGAGGGGCTCACC 600	BI GANCGCGGCCTCGAGAACTCGCTTCCGCTCGAGGTCGTCCGCCGGCGCCATGACCAITCCGC 5	1 GGACGCGGCCTCGAGAACACGCTTCCGCCTCGAGGTCGTCCGCGGGCGCCATGGTCATCCGC 5	421 GCNCTCCTCGAGCACCAGCTCTGCGGTGTNCTCCCNACGTCGACTCGAC	1 ACGACTGGTTTCGGCGGCTCGGCCGACACCCGGACTGAGGATGCNATCTCGCTCCAGAAG	ACCACGGGTTTCGGTGGCCCGACCACGAGGACTGAGGATGCAGTCAGCCTCCAGAAG 4	331 CGCGTCGACAAGAGCGTCGACTTCCTCAAGGCCCAGCTTCAGAACTCGGTCTACGGAGTC 390	2/2 TOBOGCOCIC COCKARGE COCKARGE COCKET C CASACGACCACCACCACACT COCCCA 300 [	BI ACCCCACCGNNACCGNNNICGAACTCGACGGGTACACCCCTCACCCTCGGNGACGTCG	15 ACCCCACCGACGACGTCGTCGAGCTCAGCGGGTACAGCCTCACCGTCCGTGACGTTG 2

Я Ŋ ႘

> 1348 1261

1381

1408 1321

1501 1528 1441 1468

```
NNGTCCTCGCCNNNNGCCANNAGGTCTCGCTCGCNGCCGTCAACGCCTGGAAGGTCGCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      TOGTCCTCGCCCTCTGCCA--ACGTCACCCCTTACTGCCGTCAACGCGTGGAAAGGTTGCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CTCGAGCCGCGCTGGCACGACGCCTTCTCGTACGCGACCGGCACCGTCGTCGAGCTCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CCGACTCTCCAGCAGCACCTCGGCACTGGCCTCGACGTC------AACGCA 1755
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CAGGCCGTCGACCTCCGCGCGATGGAGTTCGAGTTCAAGAAGCAGTTCGACCCGNTNNTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CAGGCCGTCGACCTCCGCCGCGATGGAGCTCCGACTTCAAGAAGCAGTTCGACCCCTTCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ACTGCCGAGGCCAACGACGTCCTTTTCTCTCTCTCTCTCGCCTCGCACCTGTACTGCACGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   GCCGCNGCNGACACTTCGGAGCTCGGNCACCTTGCCAACCCGGTNACGACCCACGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CACATCGCTGCTTACGCTTCGGAGCTCGGCCACCTTGCCAACCCGGTCACTACCTTCGTC 1527
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CONTCCTGCCTGCCGAGGACCCNTCGCTCTCCTATCACTGCAAGGGCCTCGACATT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                GGCAAGCTCAACTTCACGCAGCTCACCGAGATGCTCAACGCCGGCATGAACCGCGGCCTN 1380
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GGCAAGCTCAACTTCACGCAGTGCACCGAGTTGCTCAACGCTGCCATGAACCGCGGCCTG 1407
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CCGCCGAGAAGGCCATCTCGCTCACGCGCNANGTCCGCGACNCCTTCTGGNCGGCNCCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CGGCCGAGAAGGCCATCTCGCTCACGCGCGAGGTGCGCAACCGCTTCTGGCAGACGCCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             CTTGCGCTCGAGGTCAAGAAGGCGTCTCAACAAGCGTCTCGAGCAGGACGACGACGTACGAC 1815
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CAGCCGGCNGAGATGGGCAACCAGGCCGTCAACTCGCTCGCNCTCATCTCGGCNCGCCGC
GGTCGTCA-GTACACGTGTATAGAGCCTGGAATGGATTGCAAGTCTTCGAAGTTCAAAAAA 2411
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CGTCGTCGTCGCCCCGCGCTCNCGTACCTCTCGCCGCGCACGCGCGCGTCCTGTACTCGTTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CTTCGCAGGCGCCGCACGCATACCTCTCGCCGCGCACGCGCGTCCTGTACTCGTTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CTCGAGCCGCGCTGGCACGACGCCTTCTCGTTCGCGACCGGCACCGTCGTCGAGNNNNNN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CTCGNGGACAAGGTCAACAAGNCGCTCNACAAGCGNCTCGAGCAGACCAACTCGTACGAC
                                                                                                                                                             NNNCCNNNNNNNCTNTTNGNNNTCGNNTCNTGNCNNNNNCGGANNTNNCNNCNNNNNNN
                                                                                                                                                                                                                                                                               ACGTCCTCGTCAAGATGCTCGCGTA-AGGCCCGAGCAAGCCTCGCCTAGACGCCCGCCTC
                                                                                                                                                                                                                                                                                                                                        TGACGATCGGCACCAACGTCTCCCGCATCTACGAGGCCATCAAGNNCGGCNGCATCAACC
                                                                                                                                                                                                                                                                                                                                                                                  AGACGATCGGGGAGCAACGTCTCGCGCATCTACGAGGCCATCAAGGACGGCCGCATCAACC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                         TGCGCGAGGAGCTCGGCGTGCAGGCGCGCGCGCGACGTGTTTGTCGGCGTGCAGCAGG
                                                                   THNINICITYNICTCHCHNINIANCHNGTCHNTHNININCTHNINGHHTHNININNINCHNINC
                                                                                                              TGTCGCCTTACTCTCGCCGTCATCACGTCTCTCAGTTCTTTCGTATCCCGCGTCTCTC
                                                                                                                                                                                                       ACCCCAAGACCAGCTTTTCGACGTCGTGTCGTGCCAAGAACGGACTTTCCTCCATACACA
                                                                                                                                                                                                                                                 ACGTCCTCGTCAAGATGCTCGCNTAGNNNCNCNNNCNANNCTCGCNTNNNNNCCNNNCNC
                                                                                                                                                                                                                                                                                                                                                                                                                            TCCGCGAGGAGCTCGGCGTCAAGGCCCGCCGCCGCGACGTCTTCCTCGGCAAGCAGGAGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1467
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1440
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1993
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1933
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1860
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1875
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1740
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1680
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1707
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1620
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1647
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1560
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1500
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1320
                                                                                                                                                                                                                                                                                                  2232
                                                                                                                                                                                                                                                                                                                                            2160
                                                                                                                                                                                                                                                                                                                                                                                       2173
                                                                                                                                                                                                                                                                                                                                                                                                                                   2100
                                                                                                                                                                                                                                                                                                                                                                                                                                                                           2113
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          2040
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      2053
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1980
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1920
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1800
                                                                           2340
                                                                                                                                                                                                                                                      2220
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                APPLICANT: Tang, Xiao-Song
ITITLE OF INVENTION: BIOPRODUCTION OF PARA-HYDROXYCINNAMIC ACI
FILE REFERENCE: BC1009 US CIP
CURRENT APPLICATION NUMBER: US/09/765,873A
CURRENT FILING DATE: 2001-01-19
PRIOR APPLICATION NUMBER: US 09/627,216
PRIOR FILING DATE: 2000-07-27
PRIOR FILING DATE: 2000-07-27
PRIOR APPLICATION NUMBER: US 60/147,719
PRIOR PELING DATE: 1999-08-06
NUMBER OF SEQ ID NOS: 38
SOFTWARE: Microsoft Office 97
SEQ ID NOS: 38
LENGTH: 2151
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      NAME/KEY: CDS; LOCATION: (1)..(2151) US-09-765-873A-9
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                RESULT 5
US-09-765-873A-9
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                              맑
                                                                                             Ş
                                                                                                                                          B
                                                                                                                                                                             5
                                                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                                        δÃ
                                                                                                                                                                                                                                                                                                                       В
                                                                                                                                                                                                                                                                                                                                                             Ś
                                                                                                                                                                                                                                                                                                                                                                                                              В
                                                                                                                                                                                                                                                                                                                                                                                                                                                    δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Sequence 9, Application US/09765873A Patent No. US20010053847A1 GENERAL INFORMATION:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Matches 1565;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Query Match
Best Local Similarity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           TYPE: DNA ORGANISM: mutant
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        FEATURE:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         2401 NNNANAA 2408
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             2341 NGTIMMCAMMACNCMIMMIMMAMICNGGNAMNGANTIMANGINITNCGNGNICHIMMIN 2400
                                                                                                                                              465
                                                                                                                                                                                                                                   405
                                                                                                                                                                                                                                                                                                                          345
                                                                                                                                                                                                                                                                                                                                                                    399
                                                                                                                                                                                                                                                                                                                                                                                                                285
                                                                                                                                                                                                                                                                                                                                                                                                                                                           339
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     225
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 279
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           165
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       105 GCACCTGCCCACAACCCAGGTCACGCAGGTCGACATCGTCGAGAAGATGCTCGCCGCGCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 159
              639
                                                     525
                                                                                                                                                                                      519
                                                                                                                                                                                                                                                                               459
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     99 CGCCGCTCCGACCAAGTCGGCTGCGGGCCCCACTTCGGCTCTCCGCCGCCACGCCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CGATGGCCACGCGCGCACCAGTCGCAGCTCGAGGATCGTGCAGGAGCTCCTCAGCGACCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   АААААААА 2419
              GAACCACCGCATCACGCCCATCGTCCCCCTCCGCGGCTCCATCTCGGCGTCGGGCGACCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CGCGAGGAAGGCCAGGCCTGTCCGCGTCAAGGACAGCGACGAGATCCGCTCAAAGATTGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      CGCCCGAAGGGGCGCAGGGTCCGCGTCCAGAACGACGAGATCCGCGCACGCGTCGA 338
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GACCGACTCGACGCTCGACGCTACTCGCTCAACCTCGGAGACGTCGTCTCGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      CACCGACGACGTCGTCGAGCTCGGGGTACAGCCTCACCGTGACGTTGTCGGCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           COTCOCATCCCCAAAGCAGGCTGTCAATGGCGCCTCGACCAACCTCGCAGTCGCAGGCTC 104
                                                     CTTGACCCGCGCCACTCGGCTGTCCGCCTCGTCGTCGAGGCGCTCACCAACTTCCT
                                                                                             GCTCACGCGTGGCCACTCGGCCGTCGCCTCGTCGTCGTTGAGGCGCTCACCAACTTCTT
                                                                                                                                              TCTCGAGAACTCGCTTCCCCCTCGAGGTTGTTCGCGGGCGCCATGACAATCCGCGTCAACAG
                                                                                                                                                                               CCTCGAGAACACGCTTCGGCTCGAGGTCGTCGCGGCGGCGCATGGTCATCCGCGTCAACTC
                                                                                                                                                                                                                                                                             coageaccaectroreceses
                                                                                                                                                                                                                                                                                                                       ATTTGGCGGATCCGCAGACACCCGCACCGAGGACGCCATCTCGCTCCAGAAGGCTCTCCT
                                                                                                                                                                                                                                                                                                                                                                      TTTCGGTGGCTCGGCCGACACGAGGACTGAGGATGCAGTCAGCCTCCAGAAGGCGCTCAT
                                                                                                                                                                                                                                                                                                                                                                                                                CAAATCGGTCGAGTTCTTGCGCTCGCAACTCTCCATGAGCGTCTACGGCGTCACGACTGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                        CAAGAGCGTCGACTTCCTCAAGGCCCAGCTTCAGAACTCGGTCTACGGAGTCACCACGG
                                                                                                                                                                                                                                   Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               from Rhodotorula
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       49.5%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  <u>--</u>
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Score 1196.6; DB 9;
Pred. No. 2.4e-282;
1; Mismatches 525;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               glutinis
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Length 2151;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             ACID
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       24;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Gaps
```

8

2041 2054 1981 1994 1921 1934 1861

밁 8

Ś 뮍 8 밁 50 뮍 Ş B 8 B

2353

2221 2233 2161 2174 2101 2114

638

698

584

578

464 518 404 458 344 398

524

284

278

224

218

164

밁

Š

밁

Š

1876

밁

1801 1816 1741 1756 1681 1708 1621 1648 1561 1588

Ϋ́

밁

Ş

당

Ä 片 ž ႘ λÃ Я ¥ Я ž 岁 ¥

```
1716
                                                                                                                                                                                                                                                                                                                                                                                                                                              1425
                                                                                                                                                                                                                                                                                                                             1485
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1365
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1416
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1305
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1245
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1296
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1185
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1125
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1179
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1236
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1065
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1119
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1005
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1059
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 945
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    999
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  885
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         939
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   825
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          879
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    765
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        819
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   645
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  705
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         759
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          699
      CCTCCAGCAGCACCTCGGCACTGGCCTCGACGTCA-----
                                                                                                                          CGACCTCCGCGCGATGGAGGTCGACTTCAAGAAGCAGTTCGACCCGCTTCTCCCGACTCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CTTGACGGCTCTCACGGTGGAGGCCATGGTCGGCCAGCAGGGCTCGTTCGCTTCAT
                                                                                        CGACTTGCGCGCGACCGAGTTCGAGTTCAAGAAGCAGTTCGGCCCAGCCATCGTCTCGCT
                                                                                                                                                                                                      GTCCAACGACGTCCTTTCTCTCCTCCTCGCCACCCACCTCTACTGCGTTCTCCAAGCCAT
                                                                                                                                                                                                                                                       GGCCAACGACGTCTTTCTCTCTCTCTCGCCTCGCACCTGTACTGCACGCTCCAGGCCGT
                                                                                                                                                                                                                                                                                                                       TGAGATGGCGAACCAGGCGGTCAACTCGCTTGCGCTCATCTCGGCTCGTCGCACGACCGA
                                                                                                                                                                                                                                                                                                                                                         TGCTTACGCTTCGGAGCTCGGCCACCTTGCCAACCCGGTCACTACCTTCGTCCAGCCCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 CCTCGCTGCCGAGGACCCGTCGCTCAACTATCACGGCAAGGGCTTGGACATTCACATCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        TGCCGCTGTGGCCAACACCATGGAGAAGACTCGCCTCGGGCTCGCCCAGATCGGCAAGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   GTCGGCTGTCTCGATTTCGATGGAGAAGACCAGGCTCGCACTCGCCCTCATCGGCAAGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CGACAACCCGCTCCTCGACGTCGAGGAACAAGCAGACCGCGCGCACGGGCGAACTTCCAGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CCACGACGTCTGCCGCCCCGCACCCCGGCCAGGTCGAGGTCGCGCGCAACATCCGCACGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                        GGCGTACACCTCGGAGTTGGGACACCTCGCCAACCCTGTGACGACGCATGTCCAGCCGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ceredecedecida a da ce en cerece a ce a ce en ce
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CGACAACCCTCTCATCGACGTCGAGAACAAGACTTCGCACCACGGCGGCAATTTCCAGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        GGGCATTCTCCGCCAGGACCGCTACCCCTTGCGCACGTCTCAGTGGCTCGGCCCGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           GCTCACGGCCATGACGGTCGAAGCGATGGTCGGCCACGCCTCGTTCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       GGGCATTCTTCGCCAGGACCGCTACCCGCTCCGCACGTCGCCTCAGTTCCTCGGCCCCCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CCTCGAGGGAAGCCGCTTTGCTGTCCACCATGAGGAGGAGGTCAAGGTCAAGGACGACGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       TCACGACGTCACGCGCCTCACCCGACGCAGATCGAAGTCGCGGGAAACATCCGCAAGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         AGCATCGATGGCCACCCTCGCTCTGCACGACGCACACATGCTCTCGCTCCTCGCAGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CGCCTCGATGGCGACCCTCAGTCTGCACGACTCGCACATGCTCTCGCTCCTCTCGCAGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             TTTGCACGAGGGAACCGAGAAGATCATGTTTGCGCGCGAGGCCCATCTCGCTCTTTGGTCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CAGCCGGCTCTCGTACATCGCCGGCGCCCATCACCGGTCACCCCCGACGTCAAGGTTCACGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             CCTTTCCGGCTCGTCGTTTGCCGTTGAGCACGAGGAGGAGGAGGTCAAGGTCAAGGACGACGA 1118
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CGAGCCCGTCGTCCTCGGCCCGAAGGAGGGTCTCGGTCTCGTCAACGGCACCGCCGTCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CGAGGCAGTCGTCCTCGGCCCGAAGGAGGGTCTCGGTCTGGTCAACGGAACGGCCGTCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CGTCCACGAGGGCAAGGAGAGATCCTGTACGCCCGCGAGGCGATGGCGCTCTTCAACCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             CTCTCTCTCTACATTGCAGCGGCCATCAGCGGTCACCCGGACAGCAAGGTGCACGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CAACCACGGCATCACCCCCATCGTCCCCCTCCGCGGCACCATCTCTGCGTCGGGCGACCT
-ACGCACTTGCGCT 1763
                                                                                                                                                                                                                                                             1655
                                                                                                                                                                                                                                                                                                                                                                              1595
                                                                                                                                                                                                      1604
                                                                                                                                                                                                                                                                                                                       1544
                                                                                                                                                                                                                                                                                                                                                                                                                                     1484
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1535
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1424
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1475
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1364
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1415
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1304
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1355
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1244
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1295
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1184
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1235
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1124
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1178
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1064
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1004
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1058
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           944
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  998
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         884
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   938
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  818
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         704
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       758
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            764
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              644
                                                                                                                                                                                                                                                                                                                                                                                                                                              RESULT 6
US-10-138-970A-23

VS-quence 23, Application US/10138970A

Publication No. US20030079255A1

Publication No. US20030079255A1

REPEICANT: Sariasiani, Sima

APPLICANT: Tang, Xiao-Song

APPLICANT: Qi, Wei Wei

TITLE OF INVENTION: Methods for the Production of Tyrosine, Cinnamic Acid and Para-
TITLE OF INVENTION: Mydroxycinnamic Acid

FILE REFERENCE: CL1777

CURRENT APPLICATION NUMBER: US/10/138,970A

CURRENT FILING DATE: 2002-07-23

NUMBER OF SEQ ID NOS: 24

SOFTWARE: Microsoft Office 97

SEQ ID NO 23

LENGTH: 2151

TYPE: DNA

ORGANISM: artificial sequence

FEATURE:

OTHER INFORMATION: mutant from Rhodotorula glutinis

US-10-138-970A-23
                                          5
                                                                                                             В
                                                                                                                                                                 Ś
                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                               Ś
      뭉
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             ₽
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                      Query Match 49.5%; Score 1196.6; DB 15; Length 2151; Best Local Similarity 74.0%; Pred. No. 2.4e-282; Matches 1565; Conservative 1; Mismatches 525; Indels 24;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 2136
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           2184
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            2124
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      2016
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             2064
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1956
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1845
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1896
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1884
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1824
   165
                                                          219
                                                                                                                    105
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1665 CATCGACCAGCACTTTGGCTCCGCCATGACCGGCTCGAACCTGCGCGACGAGCTCGTCGA
                                                                                                                                                                                                                               45
                                                                                                                                                                                                                                                                                         99
                                                   CACCGACGACGTCGTCGAGCTCAGCGGGTACAGCCTCACCGTCGTCGACGTTGTCGGCGC 278
                                                                                                                                                                 CGATGGCCACGCCGCACCAGTCGCAGCTCGAGATCGTGCAGGAGCTCCTCAGCGACCC 218
                                                                                                                                                                                                                           CGTCGCATCCGCAAAGCAGGCTGTCAATGGCGCCTCGACCAACCTCGCAGTCGCAGGCTC 104
                                                                                                                                                                                                                                                                               ceccecroceaccaaerceecroceecccaerroceecrocecececececeeccies 158
   GACCGACTCGACGCTCGAACTCGACGCTACTCGCTCAACCTCGGAGACGTCGTCTCGGC
                                                                                                             GCĂCCTGCCCACAACCCAGGTCACGCAGGTCGACATCGTCGAGAAGATGCTCGCCGCGCCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CAAGATGCTCGCGTA 2198
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             GCTCGGCGTGCAGGCGCCGCGGCGACGTGTTTGTCGGCGTGCACCAGGAGACGATCGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 CAAGATGCTCGCTTA 2150
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CTCGAACGTCTCCAAGATCTACGAGGCCATCAAGTCGGGCAGGATCAACAACGTCCTCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                GAGCAACGTCTCGCGCATCTACGAGGCCCATCAAGGACGGCCGCATCAACCACGTCCTCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 GCCCGCGCTCTCGTACCTCTCGCCGCGCACTCAGATCCTCTACGCCTTCGTCCGCGAGGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GGCCATCTCGCTCACGCGCAGGTGCGCCAACCGCTTCTGGCAGACGCCGTCTTCGCAGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CGAGGTCAAGAAGGCGCTCAACAAGCGTCTCGAGCAGGACGACGACGTACGACCTCGAGCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GGCCATCTCGCTCACCCGCCAAGTCCGCGAGACCTTCTGGTCCGCCGCGTCGACCTCGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                GTC-----GCTCTCGCTCGCCGCCGTCAACGCCTGGAAGGTCGCCGCCGAGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       GCCCTCTGCCAACGTCACCCTTACTGCCGTCAACGCGTGGAAGGTTGCCTCGGCCGAGAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 GCGCTGGCACGACGCCTTCTCCTTCGCCGCCGGCACCGTCGTCGAGGTCCTCTCGTCGAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     gcgcregcaceacecrrerecraceceacececeacecrereacercerecrerecre
```

2135 2183 2075 2123 2015 2063 1955

Para-

1895 1943 1844 1883

Ś B δ 뮍 S 밁 8

Ş g

Gaps

164

В Ş Вþ 8 ď 5 문 5 В δ В S В Ş B 8 В 8 B γQ В 8 В 18 В 5

¥

\* \* \* \* \* \* \*

```
밁
                                                                                                                                                                                                                                                                                                                                                                                                                                Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                             뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ş
                                                                     8
                                                                                                뀱
                                                                                                                                                  B
                                                                                                                                                                      S
                                                                                                                                                                                                    片
                                                                                                                                                                                                                           Ś
                                                                                                                                                                                                                                                      片
                                                                                                                                                                                                                                                                           Ś
                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                               Ś
                                                                                                                                                                                                                                                                                                                                                                              5
                                                                                                                                                                                                                                                                                                                                                                                                            밁
멼
                     Š
                                                뮍
                                                                                                                       8
                                                                                                                                                                                                                                                                                                           1785
                                                                                                                                                                                                                                                                                                                                                                                                             1665
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1596
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1485
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1425
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1365
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1416
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1305
                                                                                                                                                    1956
                                                                                                                                                                                                      1896
                                                                                                                                                                                                                               1944
                                                                                                                                                                                                                                                       1845
                                                                                                                                                                                                                                                                                 1884
                                                                                                                                                                                                                                                                                                                                   1824
                                                                                                                                                                                                                                                                                                                                                           1725
                                                                                                                                                                                                                                                                                                                                                                                    1764
                                                                                                                                                                                                                                                                                                                                                                                                                                    1716
                                                                                                                                                                                                                                                                                                                                                                                                                                                             1605
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1656
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1545
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1356
                                                                                                    2016
                                                                                                                            2064
                                                                                                                                                                             2004
                  2184 CAAGATGCTCGCGTA 2198
                                                                          2124 GAGCAACGTCTCGCGCATCTACGAGGCCATCAAGGACGGCCGCATCAACCACGTCCTCGT 2183
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                GGCCAACGACGTCCTTTCTCTCCTTCTCGCCTCGCACCTGTACTGCACGCTCCAGGCCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ggccarcrcecrcaceceaegrececaacecrrcreecaeacecerrrreecaeac
                                                                                                                                                                                                                                                                                GAAGGTGAACAAGACGCTCGCCAAGCGCCTCGAGCAGACCAACTCGTACGACCTCGTCCC 1784
                                                                                                                                                                                                                                                                                                                                                                                  CGAGGTCAAGAAGGCGCTCAAGAAGCGTCTCGAGCAGACGACGACGTACGACCTCGAGCC 1823
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CGACCTCCGCGCGATGGAGCTCGACTTCAAGAAGCAGTTCGACCCGCTTCTCCCGACTCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                GTCCAACGACGTCCTTCTCTCCTCCTCGCCACCCACCTCTACTGCGTTCTCCAAGCCAT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    AGAGATGGGCAACCAGGCCGTCAACTCGCTCTCATCTCCGCGCGCACCGCACTGCCGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   GGCGTACACCTCGGAGTTGGGACACCTCGCCAACCCTGTGACGACGCATGTCCAGCCGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             TGCTTACGCTTCGGAGCTCGGCCACCTTGCCAACCCGGTCACCTTCGTCCAGCCCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CCTCGCTGCCGAGGACCCGTCGCTCAACTATCACGGCAAGGGCTTGGACATTCACATCGC 1475
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      CCTCCAGCAGCACCTCGGCACTCGACGTCA-----ACGCACTTGCGCT 1763
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  TGAGATGGCGAACCAGGCGGTCAACTCGCTTGCGCTCATCTCGGCTCGTCGCACGACCGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CAAGATGCTCGCTTA 2150
                                                                                                  GCCCGCGCTCTCGTACCTCTCGCCGCGCACTCAGATCCTCTACGCCTTCGTCCGCGAGGA
                                                                                                                                                                                                      GGCCATCTCGCTCACCCGCCAAGTCCGCGAGACCTTCTGGTCCGCCGCGTCGACCTCGTC
                                                                                                                                                                                                                                                       GTC------GCTCTCGCTCGCCGCCGTCAACGCCTGGAAGGTCGCCGCCGAGTC 1895
                                                                                                                                                                                                                                                                                                         GCGCTGGCACGACGCCTTCTCCTTCGCCGCCGCCACCGTCGTCGAGGTCCTCTCGTCGAC 1844
                                                                                                                                                                                                                                                                                                                                                                                                            CATCGACCAGCACTTTGGCTCCGCCATGACCGGCTCGAACCTGCGCGACGAGCTCGTCGA 1724
                                                                                                                                                                                                                                                                                                                                                                                                                                                                CGACTTGCGCGCGACCGAGTTCGAGTTCAAGAAGCAGTTCGGCCCAGCCATCGTCTCGCT
                                                  ctcgaaceterczaagatetacgaggecateaagteggeaggateaacaaceteeteet
                                                                                                                                                                                                                                                                                                                                                                                                                                                                1664
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1715
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1604
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1655
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1544
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1484
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1535
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1424
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1364
                                                   2135
                                                                                                                                                                               2063
                                                                                                                                                                                                         1955
                                                                                                                                                                                                                                2003
                                                                                                    2075
                                                                                                                                                       2015
```

RESULT 7

US-10-188-523B-9
; Sequence 9, Application US/1018B523B
; Publication No. US20030170834A1
; Publication No. US20030170834A1
; GENERAL INFORMATION:
; APPLICANT: Tang, Xiao-Song
; TITLE OF INVENTION: BIOEROBUCTION OF PARA-HYDROXYCINNAMIC ACID
; FILE REFERENCE: BC1009 US DIVCIP
; CURRENT APPLICATION NUMBER: US/10/188,523B
; CURRENT FILING DATE: 2000-10-17
; PRIOR APPLICATION NUMBER: US 09/627,216
; PRIOR FILING DATE: 2000-07-27

멍

Š

밁

Š

유

8 B

멍

망

ă

Š

망

```
유
                                                                                                     뫄
                                                                                                                                                                     Ş
                                                                                                                                                                                                                        40
VQ
                                                                                                                                                                                                                                                                                                                                                 장
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             PRIOR APPLICATION NUMBER: US 60.
PRIOR FILING DATE: 1999-08-06
NUMBER OF SEQ ID NOS: 38
SOFTWARE: Microsoft Office 97
SEQ ID NO 9
SEQ ID NO 9
TYPE: DNA
ORGANISM: Rhodotorula glutinis
PEATURE:
NAME/KEY: CDS
LOCATION: (11...(2151)
OTHER INFORMATION:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               유 성
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Дb
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     멍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           중 유
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                B.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      문
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           ďď
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             US-10-188-523B-9
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Query Match
Best Local Similarity
Matches 1565; Conserv
                                                  879
      825
                                                                                                                     765
                                                                                                                                                                               819
                                                                                                                                                                                                                                           705
                                                                                                                                                                                                                                                                                                 759
                                                                                                                                                                                                                                                                                                                                                                 645
                                                                                                                                                                                                                                                                                                                                                                                                                       669
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    585
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             639
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      525
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   579
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               465
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  405
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        459
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     345
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              399
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          285
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    339
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             225
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            219
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      165
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         105
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  159
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               4.
U
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        99
CGCCTCGATGGCGACCCTCAGTCTGCACGACTCGCACATGCTCTCGCTCTCTCGCAGGC
                                                                                                                  CGAGCCCGTCGTCCTCGGCCCGAAGGAGGGTCTCGGTCTCGTCAACGGCACCGCCGTCTC
                                                                                                                                                                                                                                                                           TTTGCACGAGGGAACCGAGAAGATCATGTTTGCGCGCGCAGGCCATCTCGCTCTTTGGTCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   CGAGGCAGTCGTCCTCGGCCCGAAGGAGGTCTCGGTCTGGTCAACGGAACGGCCGTCTC
                                                                                                                                                                                                                                           CGTCCACGAGGCAAGGAGAAGATCCTGTACGCCCGCGAGGCGATGGCGCTCTTCAACCT
                                                                                                                                                                                                                                                                                                                                                                 CTCTCCTCTCCTACATTGCAGCGGCCATCAGCGGTCACCCGGACAGCAAGGTGCACGT
                                                                                                                                                                                                                                                                                                                                                                                          CAGCCCGCTCTCGTACATCGCCGGCGCCATCACCGGTCACCCCGACGTCAAGGTTCACGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CAACCACGCATCACCCCATCGTCCCCCTCCGCGCACCATCTCTGCGTCGGGCGACCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       GAACCACCGCATCACGCCCATCGTCCCCCTCCGCGGCTCCCATCTCGGGGTCGGGGCGACCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CCTCGAGAACACGCTTCCGCTCGAGGTCGTCCGCGGCGCCATGGTCATCCGCGTCAACTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CGAGCACCAGCTCTGCGGCGTGACGCCGACGTCCGYCTCGTCCTTCAGCGTCGGACGCGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           TTTCGGTGGCTCGGCCGACACGAGGACTGAGGATGCAGTCAGCCTCCAGAAGGCGCCTCAT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CAPATCGGTCGAGGTCTTGCGCTCGCAACTCTCCATGAGCGTCTACGGCGTCACGACTGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             CGCCCGCAAGGGGCCAGGGTCCGCGTCCAGAACGACGACGAGATCCGCCGCACGCGTCGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CACCGACGACGTCGTGAGGTCAGCGGGTACAGCCTCACCGTCGACGTTGTCGGCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      GCACCTGCCCACAACCCAGGTCACGCAGGTCGACATCGTCGAGAAGATGCTCGCCGCGCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CGATGGCCACGCGCGCACCAGTCGCAGCTCGAGATCGTGCAGGAGCTCCTCAGCGACCCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CGCCGCTCCGACCAAGTCGGCTGCGGGCCCCACTTCGGCTCTCCGCCGCCACGCCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               reregada a en escribe de deservos de la consecución del consecución de la consecució
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CGAGCACCAGCTCTGCGGTGTTCTCCCTTCGTCGTTCGACTCGTTCCGCCTCGGCCGCGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     ATTTGGCGGATCCGCAGACACCGCACCGAGGACGCCATCTCGCTCCAGAAGGCTCTCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 CAAGAGCGTCGACTTCCTCAAGGCCCAGCTTCAGAACTCGGTCTACGGAGTCACCACGGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CGCGAGGAAGGCCAGGCCTGTCCGCGTCAAGGACAGCGACGAGATCCGCTCAAAGATTGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   GACCGACTCGACGCTCGAACTCGACGGCTACTCGCTCAACCTCGGAGACGTCGTCTCGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CGTCGCATCCGCAAAGCAGGCTGTCAATGGCGCCTCGACCAACCTCGCAGTCGCAGGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 49.5%;
ilarity 74.0%;
Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Score 1196.6; DB 15;
Pred. No. 2.4e-282;
1; Mismatches 525; I.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         60/147,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              24;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           2151
                                                                                                                  824
                                                                                                                                                                               878
                                                                                                                                                                                                                                                                                                 818
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    644
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             869
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      584
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   638
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            524
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     578
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               464
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 398
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      338
                                                                                                                                                                                                                                           764
                                                                                                                                                                                                                                                                                                                                                              704
                                                                                                                                                                                                                                                                                                                                                                                                                       758
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        518
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     404
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           458
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       344
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             284
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   224
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         278
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      164
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           104
                                                            8
                                                                                                                                                                                                                                                                                                           5
                            В
                                                                                                                                        日
                                                                                                                                                                                        Ş
                                                                                                                                                                                                                                                     B
                                                                                                                                                                                                                                                                                                                                                                                    뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                    5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Вb
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ϋ́
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             멍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         멍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1656
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1485
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1536
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1476
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1365
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1416
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1305
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1245
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1179
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1125
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1005
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1236
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      945
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                999
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      939
                                                                      GCCATCTCGCTCACGCGCGAGGTGCGCAACCGCTTCTGGCAGACGCCGTCTTCGCAGGC
                                                                                                                                                                                                                                                                                                                                                                                                                              CGAGGTCAAGAAGGCGCTCAACAAGCGTCTCGAGCAGACGACGACGACGTACGACCTCGAGCC
                                                                                                                                                                                  GCCCTCTGCCAACGTCACCCTTACTGCCGTCAACGCGTGGAAGGTTGCCTCGGCCGAGAA
                                                                                                                                                                                                                                                                                                    GGCCATCTCGCTCACCCGCCAAGTCCGCGAGACCTTCTGGTCCGCCGCGTCGACCTCGTC
                                                                                                                                                                                                                                                                     GCGCTGGCACGACGCCTTCTCCCTTCGCCGCCGGCACCGTCGACGTCCTCTCGTCGAC
                                                                                                                                                                                                                                                                                                                                                                                          CGACCTCCGCGCGATGGAGCTCGACTTCAAGAAGCAGTTCGACCCGCTTCTCCCGACTCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GTCCAACGACGTCCTTCTCTCCTCGCCACCCACCTCTACTGCGTTCTCCAAGCCAT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            GGCCAACGACGTCCTTCTCTCTCTCTCGCCTCGCACCTGTACTGCACGCTCCAGGCCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        AGAGATGGGCAACCAGGCCGTCAACTCGCTCGCTCTCATCTCCGCGCGCCCCACTGCCGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CCTCGCTGCCGAGGACCCGTCGCTCAACTATCACGGCAAGGGCTTGGACATTCACATCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CAACTTCACGCAGCTCACCGAGATGCTCAACGCCGGCATGAACCGCGGCCTCCCTG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   GTCGGCTGTCTCGATTTCGATGGAGAAGACCAGGCTCGCACTCGCCCTCATCGGCAAGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CGACAACCCGCTCCTCGACGTCGACGAACAAGCAGACCGCGCGCACGGCGCGACCTTCCAGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             CGACTTGCGCGCGACCGAGTTCGAGTTCAAGAAGCAGTTCGGCCCAGCCATCGTCTCGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           TGAGATGGCGAACCAGGCGGTCAACTCGCTTGCGCTCATCTCGGCTCGTCGCACGACCGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 GGCGTACACCTCGGAGTTGGGACACCTCGCCAACCCTGTGACGACGCATGTCCAGCCGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CCTCGCGGCCGAAGACCCCTCGCTCTCCTACCACTGCAAGGGCCTCGACATCGCCGCTGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                reccecteresectancaccatesasasasacresecteses et coccasa estas 
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        egecarricino escaso de la constanta de la cons
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    GGGCATTCTTCGCCAGGACCGCTACCCGCTCCGCACGTCGCCCCAGTTCCTCGGCCCGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      TCACGACGTCACGCGCCTCACCCGACGCAGATCGAAGTCGCGGGAAACATCCGCAAGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      CCACGACGTCTGCCGCCCGCACCCCGGCCAGGTCGAGGTCGCGCGCAACATCCGCACGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            GCTCACGGCCATGACGGTCGAAGCGATGGTCGGCCACGCCGGCTCGTTCCACCCCTTCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         -CGACGAC
                                                                                                                                                                                                                                                                     1844
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1604
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1544
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1535
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1424
                                                                                                                                                                                                                                                                                                                                                                                                                                                 1823
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1664
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1655
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1484
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1475
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1364
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1415
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1304
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1355
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1295
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1064
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1118
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1184
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1124
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1178
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1058
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1244
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1004
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         944
```

44	מם	Qy 519 CCTCGAGAACACGCTTCCGCTCGAGGTCGTCGGGGGGCCATGGTCATCCGCGTCAACTC 578
	yo. da	Qy 459 CGAGCACCACCTCTGCGGCGTGACGCCGACGTCCGYCTCGTCCTTCAGCGTCGGACGCGG 518
1425 GGCGTACACCTCGGAGTTGGGACACCTCGCCAACCCTGTGACGACGCCATGTCCAGCCGGC 1484 1536 AGAGATGGGCAACCGGTCAACTCGCTCGCTCATCTCCGCGCGCG	Qy Qy	Qy 399 TTTCGGTGGCTCGGCCGACACGAGGACTGAGAGGCATCAGCCTCCAGAAGGCGCTCAT 458
1365 CCTCGCGGCCGAAGACCCCTCGCTACCTACCAAAGGGCCTCGACATCGCCGGTGC 1424  1476 TGCTTACGCTTCGGAGCTCGGCCACCTTGCCAACCCGGTCACTACCTTCGTCCAGCCCGC 1535	Db Qy	OY 339 CAAGAGCTCGACTTCCTCAAGGCCCAGCTTCAGAACTCGGTCTACGGAGTCACCACGGG 398
1305 CAACTTCACGCAGCTCACCGAGATGCTCAACGCCGGCCAGAGACGCCGCCGCCCCCCCC	Qy Db	OY 279 CGCCCGCAAGGGGCGCAGGGTCCGCGTCCAGAACGACGACGAGATCCGCGCACGCGTCGA 338
56	Q	QY 219 CACCGACGACGTCGAGGTCAGGGGGTACAGCCTCACGGTGACGTTGTCGGCGC 278
96 5	0 D 1	2y 159 CGATGGCCACGGCCGCACAGTCGCAGGTCGTAGAGGAGCTCCTCAGCGACCC 218
1236 CGACAACCCGCTCCTCGACGTCGAGAACAAGCAGCCGCCCACGCCGACCTCCACCACCGCCCACCGCCAACTTCAACGACCACCGAGACAACCAGCCACGAGACAACCAGGCCAACTTCCAAGGCACGAGAACAAGCAAG	OV Db	2y 99 GGCCGCTCCGACCAAGTCGGCTGCGGGCCCCACTTCGGCTCTCCGCGCGCACGCCCGGCCT 158
65 79	A D G	Query Match 49.5%; Score 1196.6; DB 16; Length 2151; Best Local Similarity 74.0%; Pred. No. 2.4e-282; Matches 1565; Conservative 1; Mismatches 525; Indels 24; Gaps 3;
1005 CCTCGAGGGAAGCCGCTTTGCTGTCCACCATGAGGAGGAGGTCAAGGTCAAGGACGACGA 1064 1119 GGGCATTCTTCGCCAGGACCGCTACCCGCTCGGCACGTCGCCTCAGTTCCTCGGCCCGCT 1178	OV DB	; TYPE: DNA; ORGANISM: Rhodosporidium glutinis; US-10-374-366-3
1059 CCTTTCCGGCTCGTCGTTTGCCGTTGAGCACGAGGAGGAGGAGGACGACGACGACGACGACGACG	Q	
999 CCACGACGTCTGCCCCGCACCCCGGCCAGGTCGAGGTCGCGCGCAACATCCGCACGCT 1058	QY Db	; PRIOR APPLICATION NUMBER: 60/360/279 ; PRIOR FILING DATE: 2002-2-26 ; NUMBER OF SEQ ID NOS: 203 ; SOFTWARE: Patentin version 3.2
939 CTTGACGGCTCTCACGGTGGAGGCCATGGTCGGCCAGCAGGGCTCGTTCGCGCCCGTTCAT 998	Qy	FITTE OF INVENTION: METHOD FOR THE RECOMBINATION OF GENETIC ELEMENTS FILE REFERENCE: CL1794 US NA CURRENT APPLICATION NUMBER: US/10/374,366 CURRENT FILING DATE: 2003-02-26 CURRENT FILING DATE: 2003-02-26
879 CGCCTCGATGGCGACCCTCAGTCTGCACGACTCCGCACATGCTCTCGCCTCGCCAGGC 938	Db Qy	
ന ന	dg VQ	RESULT 8 JS-10-374-366-3 ; Sequence 3, Application US/10374366
759 TTTGCACGAGGGAACCGAGAAGATCATGTTTGCGCGCGAGGCCATCTCGCCTCTTTGGTCT 818	Qy	2y 2184 CAAGARGCTCGCGTA 2198  1
699 CAGCCCGCTCCTACATCGCCGGCCCATCACCGGTCACCCCGACGTCAAGGTTCACGT 756	dg VQ	CTCGAACGTCTCCAAGATCTACGAGGCCATCAAGTCGGGCAGGATCAACAACGTCCTCCT
5 CAACCACGGCATCACCCCCTCCCCCTCCGCGGCACCATCTCTGCGTCGGGCGACCT 64	Db	2016
G CAACCACCGCATCACCCCCCCCCCCCCCCCCCCACCCCCCCC	& 8	λλ 2064 GCTCGGCGTGCAGGCGCCGCGGCGACGTGTTTGTCGGCGTGCAGGAGGAGGATCGG 2123
579 GCTCACGCGTGGCCACTCGGCCGTCGTCGTCGTTGAGGCGCTCACCAACTTCTT 638	D Qy	2004 GCCGGCGCATACCTCTCGCCGCGCACGCGCGTCCTGTACTCGTTCGT

```
Sequence 18, Application US/09939408A

Fatent No. US20020102712A1

GENERAL INFORMATION:
APPLICANT: Yoshida, Roberta
APPLICANT: Polynuclectide Sequences and Methods of Obtaining and
TITLE OF INVENTION: USing Same
FILE REFERENCE: 29479/500NSCA
CURRENT APPLICATION NUMBER: US/09/939,408A
CURRENT FILING DATE: 2001-08-24
PRIOR APPLICATION NUMBER: US 09/624,693
PRIOR FILING DATE: 2000-07-24
PRIOR APPLICATION NUMBER: PCT/US01/23270
PRIOR FILING DATE: 2001-07-24
PRIOR FILING DATE: 2001-07-24
SPAIOR APPLICATION NUMBER: PCT/US01/23270
PRIOR FILING DATE: 2001-07-24
SPAIOR FILING DATE: 2001-07-24
PRIOR PRIOR FILING DATE: 2001-07-24
PRIOR PRIOR FILING DATE: 
                                                                                                  ; FEATURE:
; NAME/KEY: CDS
; LOCATION: (1)..(2
US-09-939-408A-18
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   RESULT 9
US-09-939-408A-18
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         ď
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ДĎ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          g
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ş
                          Query Match 49.5%;
Best Local Similarity' 74.0%;
Matches 1565; Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               2124
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     2016
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        2064
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1956
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    2004
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1896
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1845
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1785
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1944
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1884
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1824
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1725
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1764
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1665
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1605
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1656
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CAAGATGCTCGCTTA 2150
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CAAGATGCTCGCGTA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             GAGCAACGTCTCGCGCATCTACGAGGCCATCAAGGACGGCCGCATCAACCACGTCCTCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       GCTCGGCGTGCAGGCGCGCCGCCGGCGACGTGTTTGTCGGCGTGCAGCAGCAGGAGACGATCGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CTCGAACGTCTCCAAGATCTACGAGGCCATCAAGTCGGGCAGGATCAACAACGTCCTCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   GGCCATCTCGCTCACCCGCCAAGTCCGCGAGACCTTCTGGTCCGCCGCGTCGACCTCGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 GGCCATCTCGCTCACGCGCAGGTGCGCAACCGCTTCTGGCAGACGCCGTCTTCGCAGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GCCCGCGCTCTCGTACCTCTCGCCGCGCACTCAGATCCTCTACGCCTTCGTCCGCGAGGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    GCCTCTGCCAACGTCACCCTTACTGCCGTCAACGCGTGGAAGGTTGCCTCGGCCGAGAA 1943
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               GAAGGTGAACAAGACGCTCGCCAAGCGCCTCGAGCAGACCAACTCGTACGACCTCGTCCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CGAGGTCAAGAAGCCCTCAACAAGCGTCTCGAGCAGACGACGACGTACGACCTCGAGCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               GTC--
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        GCGCTGGCACGACGCCTTCTCCTTCGCCGCCGCCACCGTCGTCGAGGTCCTCTCGTCGAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CATCGACCAGCACTTTGGCTCCGCCATGACCGGCTCGAACCTGCGCGACGAGCTCGTCGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CGACTTGCGCGCGACCGAGTTCGAGTTCAAGAAGCAGTTCGGCCCAGCCATCGTCTCGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             CGACCTCCGCGCGATGGAGCTCGACTTCAAGAAGCAGTTCGACCCGCTTCTCCCGACTCT
                                                                                                                         (2148)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             ---GCTCTCGCTCGCCGCCGTCAACGCCTGGAAGGTCGCCGCCGCCGAGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  2198
                        Score 1196.6; DB 9;
Pred. No. 2.4e-282;
1; Mismatches 525;
                          Indels
                                                            Length
                                                            2439;
                          24;
                        Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     2135
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         2183
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    2123
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              2063
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             2075
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          2015
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1955
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1895
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1844
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1883
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1784
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1823
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1763
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1715
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1664
                      w
T
                                      밁
                                                                          Ś
                                                                                                                 맑
                                                                                                                                                 50
                                                                                                                                                                                           밁
                                                                                                                                                                                                                        5
                                                                                                                                                                                                                                                              片
                                                                                                                                                                                                                                                                                                    Ş
                                                                                                                                                                                                                                                                                                                                               망
                                                                                                                                                                                                                                                                                                                                                                             Ş
                                                                                                                                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                  S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        멍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ϋ́
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               S
                                                                                                                   1005
                                                                                                                                                                                                                                  999
                                                                                                                                                                                                                                                                                                                                               8
2
5
                                                                                                                                                                                                                                                                                                                                                                                     879
                                                                                                                                                                                                                                                                                                                                                                                                                          765
                                                                                                                                                                                                                                                                                                                                                                                                                                                              819
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    705
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               645
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 699
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        585
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       759
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            639
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                525
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           465
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                519
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      405
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               345
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     399
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          459
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           285
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              339
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    225
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        279
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               165
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 219
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        105
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              159
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  45
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   99
GGGCATTCTTCGCCAGGACCGCTACCCGCTCCGCACGTCGCCTCAGTTCCTCGGCCCGCT
                                                                                                                                                                                                                                                                  GCTCACGGCCATGACGGTCGAAGCGATGGTCGGCCACGCCGGCTCGTTCCACCCCTTCCT
                                                                                                                                                                                                                                                                                            CTTGACGGCTCTCACGGTGGAGGCCATGGTCGGCCAGCAGGGCTCGTTCGCGCCGTTCAT
                                                                                                                                                                                                                                                                                                                                                                       CGCCTCGATGGCGACCCCTCAGTCTGCACGACTCGCACATGCTCTCGCTCCTCCGCAGGC
                                                                                                               CCTCGAGGGAAGCCGCTTTGCTGTCCACCATGAGGAGGAGGTCAAGGTCAAGGACGACGA
                                                                                                                                                 TCACGACGTCACGCGCCCTCACCCGACGCAGATCGAAGTCGCGGGAAACATCCGCAAGCT
                                                                                                                                                                                                                            CCACGACGTCTGCCGCCACCCCGGCCAGGTCGAGGTCGCGCCAACATCCGCACGCT 1058
                                                                                                                                                                                                                                                                                                                                           AGCATCGATGGCCACCCTCGCTCTGCACGACGCACATGCTCTCGCTCCTCGCAGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                              CGAGGCAGTCGTCCTCGGCCCGAAGGAGGGTCTCGGTCTGGTCAACGGAACGGCCGTCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CGTCCACGAGGGCAAGGAGAAGATCCTGTACGCCCGCGAGGCGATGGCGCTCTTCAACCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             TTTGCACGAGGAACCGAGAAGATCATGTTTGCGCGCGAGGCCATCTCGCTCTTTGGTCT
                                                                                                                                                                                                                                                                                                                                                                                                                      CGAGCCCGTCGTCCTCGGCCCGAAGGAAGGTCTCGGTCTCGTCAACGGCACCGCCGTCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CAGCCCCCTCTCGTACATCGCCGGCGCCATCACCGGTCACCCCGACGTCAAGGTTCACGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GCTCACGCGTGGCCACTCGGCCGCCCCCCGCTCGTCCTTGAGGCGCTCACCAACTTCTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         eterectetetacattecacegecateagegeteacegeacageaagetageacet
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CAACCACGGCATCACCCCATCGTCCCCCTCCGCGGCACCATCTCTGCGTCGGGCGACCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CTTGACCCGCGCCACTCGCCTGTCCGCCTCGTCGTCGAGGCGCTCACCAACTTCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       TCTCGAGAACTCGCTTCCCCCTCGAGGTTGTTCGCGGCGCCATGACAATCCGGCGTCAACAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CCTCGAGAACACGCTTCCGCTCGAGGTCGTCCGCGCGCCATGGTCATCCGCGTCAACTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CGAGCACCAGCTCTGCGGTGTTCTCCCTTCGTCGTCGACTCGTTCCGCCTCGGCCGCGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CGAGCACCAGCTCTGCGGCGTGACGCCGACGTCCGYCTCGTCCTTCAGCGTCGGACGCGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             ATTTGGCGGATCCGCAGACACCCGCACCGAGGACGCCATCTCGCTCCAGAAGGCTCTCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               CGCCCGCAAGGGGCGCAGGGTCCGCGTCCAGAACGACGACGAGATCCGCGCACGCGTCGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 CACCGACGTCGTCGAGCTCAGCGGGTACAGCCTCACCGTGACGTTGTCGGCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CGATGGCCACGCGCGCACCAGTCGCAGCTCGAGATCGTGCAGGAGCTCCTCAGCGACCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CAAATCGGTCGAGTTCTTGCGCTCGCAACTCTCCATGAGCGTCTACGGCGTCACGACTGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          caaeaecerceaerrecreaaeececaecrreaeaaerceercraceeaercaecaeee
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CGCGAGGAAGGCAAGGCCTGTCCGCGTCAAGGACAGCGACGAGATCCGCTCAAAGATTGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GACCGACTCGACCTCGACCGCCTACTCGCTCAACCTCGGAGACGTCGTCTCGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      GCACCTGCCCACACCCAGGTCACGCAGGTCGACATCGTCGAGAAGATGCTCGCCGCGCCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CGTCGCATCCGCAAAGCAGGCTGTCAATGGCGCCTCGACCAACCTCGCAGTCGCAGGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   CGCCGCTCCGACCAAGTCGGCTGCGGGCCCCACTTCGGCTCTCCGCCGCACGCCCT
CGACGAC
                                                                                                                                                   1118
                                                                                                                                                                                       1004
                                    1124
                                                                        1178
                                                                                                               1064
                                                                                                                                                                                                                                                                  944
                                                                                                                                                                                                                                                                                                      998
                                                                                                                                                                                                                                                                                                                                           884
                                                                                                                                                                                                                                                                                                                                                                               938
                                                                                                                                                                                                                                                                                                                                                                                                                      824
                                                                                                                                                                                                                                                                                                                                                                                                                                                        878
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   818
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       704
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             758
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    644
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              764
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        869
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              584
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   638
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       524
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            578
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        518
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           404
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  464
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 458
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       344
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          398
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                284
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    338
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           224
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    164
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          218
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              104
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   158
```

```
1305
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1425
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1365
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1416
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1356
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1245
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1656
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1545
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1596
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1236 CGACAACCCGCTCCTCGACGTCGAGAACAAGCAGACCGCGCGACGGCGACCTTCCAGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1125 CGTCAGCGACCTCATTCACGCCCACGCCGTCCTCACCATCGAGGCCGACCAGTCGACGAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1956
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        2004
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1896
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1944
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1845
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1884
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1824
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1725
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1764
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1665
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1605
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1296 GTCGGCTGTCTCGATTTCGATGGAGAAGACCAGGCTCGCACTCGCCCTCATCGGCAAGCT
2136
                                                                              2184
                                                                                                                                                            2076
                                                                                                                                                                                                                                                                                                                 2016
                                                                                                                                                                                                                                                                                                                                                                                           2064
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              TGCCGCTGTGGCCAACACCATGGAGAAGACTCGCCTCGGGCTCGCCCAGATCGGCAAGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       GGCCAACGACGTCCTTCTCCTCCTCCCCCCCCCACCTGTACTGCACGCTCCAGGCCGT 1655
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              TGCTTACGCTTCGGAGCTCGGCCACCTTGCCAACCCGGTCACTACCTTCGTCCAGCCCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CCTCGCTGCCGAGGACCCGTCGCTCAACTATCACGGCAAGGGCTTGGACATTCACATCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CGACAACCCTCTCATCGACGTCGAGAACAAGACTTCGCACCACGGCGGCAATTTCCAGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             GCCCTCTGCCAACGTCAACCCTTACTGCCGTCAACGCGTGGAAGGTTGCCCTCGGCCGAGAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GCGCTGGCACGACGCCTTCTCGTACGCGACCGGCACCGTCGTCGAGCTCCTCTCGTCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 GAAGGTGAACAAGACGCTCGCCAAGCGCCTCGAGCAGACCAACTCGTACGACCTCGTCCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CGAGGTCAAGAAGGCGCTCAACAAGCGTCTCGAGCAGACGACGACGTACGACCTCGAGCC 1823
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CATCGACCAGCACTITGGCTCCGCCATGACCGGCTCGAACCTGCGCGACGAGCTCGTCGA 1724
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CGACTTGCGCGCGATCGAGTTCGAGTTCAAGAAGCAGTTCGGCCCAGCCATCGTCTCGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CGACCTCCGCGCGATGGAGCTCGACTTCAAGAAGCAGTTCGACCCGCCTTCTCCCGACTCT 1715
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Grece Acede certe creció en contracto de con
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               TGAGATGGCGAACCAGGCGGTCAACTCGCTTGCGCTCATCTCGGCTCGTCGCACGACCGA 1544
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GGCGTACACCTCGGAGTTGGGACACCTCGCCAACCCTGTGACGACGCATGTCCAGCCGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 CCTCGCGGCCGAAGACCCCTCGCTCTCCTACCACTGCAAGGGCCTCGACATCGCCGCTGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              edccarcicecteacceeccaaerececeaacciteteerececeeceiceaccicere
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    GGCCATCTCGCTCACGCGCGAGGTGCGCAACCGCTTCTGGCAGACGCCGTCTTCGCAGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    ececreecaceaceacecricicerreececeeceecaceireireireireireireireireac
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CCTCCAGCACCACCTCGGCACTGGCCTCGACGTCA------ACGCACTTGCGCT 1763
                                                                                                                                                                                                                                                                                                                                                                       GCTCGGCGTGCAGGCGCGCGCGGCGACGTGTTTGTCGGCGTGCAGCAGCAGAGACGATCGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               GTC-----GCTCTCGCTCGCCGCCGCCGTCAACGCCTGGAAGGTCGCCGCCGCCGAGTC
    CAAGATGCTCGCTTA 2150
                                                                          CAAGATGCTCGCGTA 2198
                                                                                                                                                            CTCGAACGTCTCCAAGATCTACGAGGCCATCAAGTCGGGCAGGATCAACGACGTCCTCCT
                                                                                                                                                                                                                                       GAGCAACGTCTCGCGCATCTACGAGGCCATCAAGGACGGCCGCATCAACCACGTCCTCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                          gecegegenenegracereregeegegeaenengareeraaegeerregreegegagga
                                                                                                                                                                                                                                                                                                                     1475
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1184
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1535
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1364
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1415
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1304
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1355
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1244
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1295
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1484
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1424
                                                                                                                                                                                                                                                                                                                                                                                                        2123
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1955
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         2003
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1895
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1943
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1844
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1883
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1784
                                                                                                                                                                         2135
                                                                                                                                                                                                                                                   2183
                                                                                                                                                                                                                                                                                                                             2075
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      2015
```

Ŋ

Я ¥ 岁 ₹

₹ Ŗ. ₹

 $\forall$ 

₹  $\forall$ ¥  $\breve{\sigma}$ 

ь

8 밁 Š 밁 Ŋ မ ž ႘ ¥ Я ¥ ႘

Ş DЪ Ş 밁 Š B 8 뫄

멂

704

RESULT

```
GENERAL INFORMATION:

APPLICANT: Tang, Xiao-Song
ITILE OF INVENTION BIOPRODUCTION OF PARA-HYDROXYCINNAMIC ACI
ITILE OF INVENTION BIOPRODUCTION OF PARA-HYDROXYCINNAMIC ACI
ITILE OF INVENTION BIOPRODUCTION OF PARA-HYDROXYCINNAMIC ACI
ITILE OF INVENTION OF INVENTION OF INVENTION OF SEQ ID NOS: 38
SOPTMARE: Microsoft Office 97
SEQ ID NO 7
                                                                                                                                                                                                                                       Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        ; FEATURE:
; NAME/KEY: CDS
; LOCATION: (1)..(2151)
US-09-765-873A-7
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 US-09-765-873A-7
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ś
                           당
                                                       8
                                                                                          片
                                                                                                                 Ş
                                                                                                                                                   밁
                                                                                                                                                                             S
                                                                                                                                                                                                             В
                                                                                                                                                                                                                                                                           뮍
                                                                                                                                                                                                                                                                                                 8
                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                 8
                                                                                                                                                                                                                                                                                                                                                                                                 B
                                                                                                                                                                                                                                                                                                                                                                                                                           Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                              B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Sequence 7, Application US/09765873A Patent No. US20010053847A1
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Query Match 49.4%;
Best Local Similarity 73.9%;
Matches 1564; Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      LENGTH: 2151
TYPE: DNA
ORGANISM: Rhodotorula glutinis
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         219
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        105
                                                                                          585
                                                                                                                                                                                                                465
                                                                                                                                                                                                                                              519
                                                                                                                                                                                                                                                                            405
                                                                                                                                                                                                                                                                                                        459
                                                                                                                                                                                                                                                                                                                                       345
                                                                                                                                                                                                                                                                                                                                                                     399
                                                                                                                                                                                                                                                                                                                                                                                                    285
                                                                                                                                                                                                                                                                                                                                                                                                                                 339
                                                                                                                                                                                                                                                                                                                                                                                                                                                                  225
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             279
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          165 gácceactrogacecticeaactrogacectactrogeticaactrogaéacactroctrotesec
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     159
   759
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    4<u>.</u>
U
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            99 CGCCGCTCCGACCAAGTCGGCTGCGGGCCCCACTTCGGCTCTCCGCCGCACGCCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CEATGGCCACGCGCACCAGTCGCAGACCTCGCAGAGATCGTGCAGGAGCTCCTCAGCGACCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            ceccecaaeeececaeeerceecarecaaaaeearceaeaaaeearceaeeaaceecaeearcea 338
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          GCACCTGCCCACAACCCAGGTCACGCAGGTCGACATCGTCGAGAAGATGCTCGCCGCGCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CGTCGCATCCGCAAAGCAGGCTGTCAATGGCGCCTCGACCAACCTCGCAGTCGCAGGCTC
                                                                                                               GAACCACCGCATCACGCCCATCGTCCCCCTCCGCGGCTCCATCTCGGCGTCGGCGCACCT
                                                                                                                                                                                   GCTCACGCGTGGCCACTCGGCCGTCGTCGTCGTCGTTGAGGCGCTCACCAACTTCTT
                                                                                                                                                                                                             refedadaaenedetreectedaddiretrededdecatdacaatecdedteaacad
                                                                                                                                                                                                                                    CCTCGAGAACACGCTTCCGCTCGAGGTCGTCCGCGGGGCCATGGTCATCCGCGTCAACTC
                                                                                                                                                                                                                                                                                                ATTTGGCGGATCCGCAGACACCCGCACCGAGGACGCCATCTCGCTCCAGAAGGCTCTCCT
                                                                                                                                                                                                                                                                                                                                                                    CAAGAGCGTCGACTTCCTCAAGGCCCAGCTTCAGAACTCGGTCTACGGAGTCACCACGGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                ĊĠĊĠĀĠĠĀĀĠĠĠĊĀĠĠĊĊŦĠŦĊĊĠĊĠŦĊĀĀĠĠĀĊĀĠĊĠĀĠĀŦĊĊĠĊŦĊĀĀĀGĀŤŦĠĀ
TITGCACGAGGAACCGAGAAGATCATGTTTGCGCGCGAGGCCATCTCGCTCTTTGGTCT
                              GTCTCCTCTCCTACATTGCAGCGGCCATCAGCGGTCACCCGGACAGCAAGGTGCACGT
                                                   CAGCCCCCTCTCGTACATCGCCCGCCCCCCCACCCCCGACCTCAACGTTCACGT
                                                                                            CAACCACGGCATCACCCCCATCGTCCCCCCTCCGCGGCACCATCTCTGCGTCGGGCGACCT
                                                                                                                                                    criteaccedededacticedecteredecerceredacededecededaceredaceredece
                                                                                                                                                                                                                                                                              CAAATCGGTCGAGTTCTTGCGCTCGCAACTCTCCATGAGCGTCTACGGCGTCACGACTGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Score 1195; DB 9; Length 21
Pred. No. 5.9e-282;
1; Mismatches 526; Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Length 2151;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 24;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   224
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          218
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        158
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                278
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             164
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         104
                                                                                                                                                                                                                                                                                                                                                                                                                                                                       284
                                                                                                                                                                                                                                                    578
                                                                                                                                                                                                                                                                                                              518
                                                                                                                                                                                                                                                                                                                                               404
                                                                                                                                                                                                                                                                                                                                                                            458
                                                                                                                                                                                                                                                                                                                                                                                                         344
        818
                                                                  758
                                                                                                 644
                                                                                                                              869
                                                                                                                                                           584
                                                                                                                                                                                          638
                                                                                                                                                                                                                     524
                                                                                                                                                                                                                                                                                   464
```

유 왕

밁 5 B

705

1844

```
CGAGGTCAAGAAGGCGTCAACAAGCGTCTCGAGCAGACGACGACGTACGACCTCGAGCC
                                                                                                                           GAAGGTGAACAAGACGCTCGCCAAGCGCCTCGAGCAGACCAACTCGTACGACCTCGTCCC
                                                                                                                                                                                                                                                                              CATCGACCAGCACTTTGGCTCCGCCATGACCGGCTCGAACCTGCGCGACGAGCTCGTCGA
                                                                                                                                                                                                                                                                                                                                    CCTCCAGCAGCACCTCGGCACTGGCCTCGACGTCA-----ACGCACTTGCGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                      CGACTTGCGCGATCGAGTTCGAGTTCAAGAAGCAGTTCGGCCCAGCCATCGTCTCGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CGACCTCCGCGCGATGGAGCTCGACTTCAAGAAGCAGTTCGACCCGCTTCTCCCGACTCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          GTCCAACGACGTCCTTTCTCTCCTCCTCGCCACCCACCTCTACTGCGTTCTCCAAGCCAT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              TGAGATGGCGAACCAGGCGGTCAACTCGCTTGCGCTCATCTCGGCTCGTCGCACGACCGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   TGCTTACGCTTCGGAGCTCGGCCACCTTGCCAACCCGGTCACTACCTTCGTCCAGCCCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     chactroacecaectectecte
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         TGCCGCTGTGGCCAACACCATGGAGAAGACTCGCCTCGGGCTCGCCCAGATCGGCAAGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        GGCCAACGACGTCCTTTCTCTCTCTCTCGCCTCGCACCTGTACTGCACGCTCCAGGCCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          GECGTACACCTCGGAGTTGGGACACCTCGCCAACCCTGTGACGACGCATGTCCAGCCGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CCTCGCTGCCGAGGACCCGTCGCTCAACTATCACGGCAAGGGCTTGGACATTCACATCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               GTCGGCTGTCTCGATTTCGATGGAGAAGACCAGGCTCGCACTCGCCCTCATCGGCAAGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CGACAACCCTCTCATCGACGTCGAGAACAAGACTTCGCACCACGGCGGCAATTTCCAGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      CGACAACCCGCTCCTCGAGAGCACAGCAGACCGCGCACGGCGGCAACTTCCAGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GGGCATTCTTCGCCAGGACCGCTACCCGCTCCGCACGTCGCCTCAGTTCCTCGGCCCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    GCTCACGGCCATGACGGTCGAAGCGATGGTCGGCCACGCCTCGTTCCACCCCTTCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      GGGCATTCTCCGCCAGGACCGCTACCCCTTGCGCACGTCTCCTCAGTGGCTCGGCCCGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            TCACGACGTCACGCGCCCTCACCCGACGCAGATCGAAGTCGCGGGAAACATCCGCAAGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CCACGACGTCTGCCGCCCGCACCCCGGCCAGGTCGAGGTCGCGCGCAACATCCGCACGCT 1058
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CCTCGAGGGAAGCCGCTTTGCTGTCCACCATGAGGAGGAGGTCAAGGTCAAGGACGACGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Addat da redece de contra de la contra del la contra de la contra del la con
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             CGCCTCGATGGCGACCCTCAGTCTGCACGACTCGCACATGCTCTCGCTCCTCTCGCAGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CGAGCCCGTCGTCCGCCCGAAGGAAGGTCTCGGTCAACGGCACCGCCGTCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  сваевсавтсятсятся в принципальной принце прин
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CGTCCACGAGGCAAGGAGAAGATCCTGTACGCCCGCGAGGCGATGGCGCTCTTCAACCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   CGACGAC
                                                                                                                                                                                                                                                                                  1724
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1715
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1655
                                                 1883
                                                                                                                                                                                                                                                                                                                                                                                                                                      1664
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1544
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1484
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1184
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1535
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1424
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1475
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1364
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1415
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1355
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1244
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1295
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1235
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1124
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1178
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1064
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1004
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1304
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            944
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  998
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                884
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              938
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    824
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                764
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Sequence 7, Application US/10188523B
Fublication No. US20030170834A1
GENERAL INFORMATION:
APPLICANT: Tang, Xiao-Song
TITLE OF INVENTION: BIOPRODUCTION OF PARA-HYDROXYCINNAMIC ACID
FILE REFERENCE: BC1009 US DIVCIP
CURRENT FILLOATION NUMBER: US/10/188,523B
CURRENT FILLOATION NUMBER: US/09/627,216
PRIOR APPLICATION NUMBER: US/09/627,216
PRIOR APPLICATION NUMBER: US/09/627,216
PRIOR FILNG DATE: 2000-07-27
PRIOR FILNG DATE: 1999-08-06
NUMBER OF CO. 10
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               ; FEATURE: CDS; NAME/KEY: CDS; LOCATION: (1)..(2151); OTHER INFORMATION: US-10-188-523B-7
                                             문
                                                                                                  Ś
                                                                                                                                                                                                뮍
                                                                                                                                                                                                                                                                      8
                                                                                                                                                                                                                                                                                                                                                        В
                                                                                                                                                                                                                                                                                                                                                                                                                      Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            ; NUMBER OF SEQ ID NOS: 38
; SOFTWARE: Microsoft Office 9
; SEQ ID NO 7
; LENGTH: 2151
; TYPE: DNA
; ORGANISM: Rhodotorula gluti
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          RESULT 11
US-10-188-523B-7
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 맑
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 뭉
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Query Match
Best Local Similarity
Matches 1564; Conserv
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          2136
                                                                                                                                                                                                                                                                      219
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    2184
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           2124
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               2064
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   2004
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1896
                                             225
                                                                                                                  279
                                                                                                                                                                                                                                                                                                                                                        105
                                                                                                                                                                                                                                                                                                                                                                                                                                  159
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1956
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1944
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1845
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1785
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            4.
5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      99
                            CGCGAGGAAGGCCAGGCCTGTCCGCGTCAAGGACAGCGACGAGATCCGCTCAAAGATTGA
                                                                             CGCCGCAAGGGGCGCAGAGGTCCAGAACGACGAGATCCGCGCACGCGTCGA
                                                                                                                                                                                            GACCGACTCGAACTCGAACTCGACGGCTACTCGCTCAACCTCGGAGACGTCGTCTCGGC
                                                                                                                                                                                                                                              CACCGACGACGTCGTGAGCTCAGCGGGTACAGCCTCACCGTCGACGTTGTCGGCGC
                                                                                                                                                                                                                                                                                                                                                GCACCTGCCCACAACCCAGGTCACGCAGGTCGACATCGTCGAGAAGATGCTCGCCGCGCGCC
                                                                                                                                                                                                                                                                                                                                                                                                              CGATGGCCACGCCGCACCAGTCGCAGCTCGAGATCGTGCAGGAGCTCCTCAGCGACCC 218
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CGTCGCATCCGCAAAAGCAGGCTGTCAATGGCGCCTCGACCAACCTCGCAGTCGCAGGCTC 104
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      CAAGATGCTCGCTTA 2150
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CAAGATGCTCGCGTA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 CTCGAACGTCTCCAAGATCTACGAGGCCATCAAGTCGGGCAGGATCAACAACGTCCTCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      GAGCAACGTCTCGCGCATCTACGAGGCCATCAAGGACGGCCGCATCAACCACGTCCTCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          GCTCGGCGTGCAGGCGCGCGCGGCGACGTGTTTGTCGGCGTGCAGCAGCAGGAGACGATCGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GGCCATCTCGCTCACGCGCAGGTGCGCAACCGCTTCTGGCAGACGCCGTCTTCGCAGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            GTC-----GCTCTCGCTCGCCGCCGCCGTCAACGCCTGGAAGGTCGCCGCCGCCGAGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          GCCCTCTGCCAACGTCACCCTTACTGCCGTCAACGCGTGGAAGGTTGCCTCGGCCGAGAA 1943
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 GCCCGCGCTCTCGTACCTCTCGCCGCGCACTCAGATCCTCTACGCCTTCGTCCGCGAGGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GGCCATCTCGCTCACCCGCCAAGTCCGCGAGACCTTCTGGTCCGCCGCGTCGACCTCGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    GCGCTGGCACGACGCCTTCTCCTTCGCCGGCCGCCACCGTCGTCGAGGTCCTCTCGTCGAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        49.4%; Score 1195; DB 15; 73.9%; Pred. No. 5.9e-282; rative 1; Mismatches 526;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    glutinis
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           2198
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Length
```

2135 2183 2075 2123 2015 2063 1955 2003 1895

Ş

1764

S 밁

1824

8

В 8 밁 Ś 멍 Ş 뮍 8 В δ В 5 밁 Ó Дb S ğ Ś В 8 뫄 Ş B δ Дb Ş

1605

1656 1545 1596 1485 1536 1425

2151; 24;

Gaps

338 224

164 278

1476

1416 1305 1356 1245 1296 1185 1236 1125 1179 1065 1119 1005 1059 945 999 885 939 825 879 765

밁

¥ ¥

\* \* \* \* \*

¥

ᠮ

	C 1475	1416 CCTCGCTGCCGAGGACCCGTCGCTCAACTATCACGGCAAGGGCTTGGACATTCACATCG	
	G 1415  -   1364	1356 CAACTTCACGCAGTGCACCGAGTTGCTCAACGCTGCCATGAACCGCGGCCTGCCT	
·	T 1355	1296 GICGGCIGTCICGATITCGAIGGAGAAGACCAGGCICGCACTCGCCCTCAICGGCAAGCI	
	C 1295   C 1244	1236 CGACAACCCGCTCGTCGACGTCGAGAACAAGCAGACCGCGCACGGCGGCAACTTCCAGGC	
	C 1235	1179 CGTGGAGGACATGATGCACGCCTACTCGACTCTCTCGCTCG	
	T 1178	1119 GGGCATTCTTCGCCAGGACCGCTACCCCTCCGCACGTCGCCTCAGTTCCTCGGCCCGCT	
	A 1118   A 1064	1059 CCTTTCCGGCTCGTTTGCCGTTGAGCACGAGGAGGAGGACGACGACGACGACGACGACGACG	
	T 1058	999 CCACGACGTCTGCCGCCCGCACCCCGGCCAGGTCGAGGTCGCGCGCAACATCCGCACGCT	
	HH 9 9 9 4 4	939 CTTGACGGCTCTCACGGTGGAGGCCATGGTCGGCCAGCAGGAGGGCTCGTTCGCGCCCGTTCAT	
	C 938	879 CGCCTCGATGGCGACCCTCAGTCTGCACGACTCGCACATGCTCTCGCTCTCTCGCAGGC	
	C 878 C 824	819 CGAGGCAGTCGTCCTCGGCCCGAAGGAGGTCTCGGTCTGGTCAACGGAACGGCCGTCTC	
	R 818	759 TTTGCACGAGGGAACCGAGAAGATCATGTTTGCGCGGGGGGGG	
	r 758	699 CAGCCCGCTCTCGTACATCGCCGGCGCCATCACCGGTCACCCCGACGTCAAGGTTCACGT	
	698 644	639 GAACCACCGCATCACGCCCATCGTCCCCCCCCCGCGGCTCCATCTCGGCGTCGGGCGACCT	
	638 584	579 GCTCACGCGTGGCCACTCGGCCGICCGCCTCGTCGTGCTTGAGGCGCTCACCAACTTCTT	
	578	519 CCTCGAGAACACGCTTCCGCTCGAGGTCGTCCGCGGCGCCCATGGTCATCCGCGTCAACTC	
	518	459 CGAGCACCTGCGGGCGTGACGCCGACGTCCGYCTCGTCCTTCAGCGTCGGACGCGG	
	1 458	399 TITCGGTGGCTCGGCCGACACGAGGÀCTGAGGATGCAGTCAGCCTCCAGAAGGCGCTCCAT	
	3 3 4 9 8	339 CAAGAGCGTCGACTTCCTCAAGGCCCAGCTTCAGAACTCGGTCTACGGAGTCACCACGGG	

ዞ

```
片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    망
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                망
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          밁
                                                   Ş
                                                                                                                           밁
                                                                                                                                                                                      Ś
                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                                  S
                                                                                                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                                                                                                                              Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1485
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1425
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1365
                                                       2184
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1896
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1845
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1785
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1725
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1764
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1665
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1605
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1545
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1596
                                                                                                                                                                                                                                                                                                                            2064
                                                                                                                                                                                                                                                                                                                                                                                              1956
                                                                                                                                                                                                                                                                                                                                                                                                                                                            2004
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1944
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1884
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       2136 CAAGATGCTCGCTTA 2150
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GGCGTACACCTCGGAGTTGGGAACACCTCGCCAACCCTGTGACGACGCATGTCCAGCCGGC 1484
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      CCTCGCGGCCGAAGACCCCTCGCTCTCCTACCACTGCAAGGGCCTCGACATCGCCGCTGC
                                                             CAAGATGCTCGCGTA 2198
                                                                                                                               CTCGAACGTCTCCAAGATCTACGAGGCCATCAAGTCGGGCAGGATCAACAACGTCCTCCT
                                                                                                                                                                                                                                                                                                                            GCTCGGCGTGCAGGCGCGCCGCGGCGACGTGTTTGTCGGCGTGCAGCAGGAGACGATCGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                        decearcicecreaceceaaciceceaaaacericiesreceeeeericaacereere
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          GGCCATCTCGCTCACGCGCAGGTGCGCCAACCGCTTCTGGCAGACGCCGTCTTCGCAGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   GCCCTCTGCCAACGTCACCCTTACTGCCGTCAACGCGGGAAAGGTTGCCTCGGCCGAGAA 1943
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      GCGCTGGCACGACGCCTTCTCGTACGCGACCGGCACCGTCGTCGAGCTCCTCTCGTCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        GAÁGGTGAÁCAAGACGCTCGCCAAGCGCCTCGAGCAGCAGCTCGTACGACCTCGTCCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CGAGGTCAAGAAGGCGCTCAACAAGCGTCTCGAGCAGACGACGACGTACGACCTCGAGCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CATCGACCAGCACTTTGGCTCCGCCATGACCGGCTCGAACCTGCGCGACGAGCTCGTCGA 1724
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CCTCCAGCAGCACCTCGGCACTGGCCTCGACGTCA------ACGCACTTGCGCT 1763
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   CGACTTGCGCGCGATCGAGTTCGAGTTCAAGAAGCAGTTCGGCCCAGCCATCGTCTCGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CGACCTCCGCGCGATGGAGCTCGACTTCAAGAAGCAGTTCGACCCGCTTCTCCCGACTCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               GTCCAACGACGTCCTTCTCTCCTCCTCGCCACCCACCTCTACTGCGTTCTCCAAGCCAT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             GGCCAACGACGTCCTTCTCTCCTTCTCGCCTCGCACCTGTACTGCACGCTCCAGGCCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  TGAGATGGCGAACCAGGCGGTCAACTCGCTTGCGCTCATCTCGGCTCGTCGCACGACCGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GAGCAACGTCTCGCGCATCTACGAGGCCATCAAGGACGGCCGCATCAACCACGACGTCCTCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            GTC------GCTCTCGCTCGCCGCCGTCAACGCCTGGAAGGTCGCCGCCGCCGAGTC 1895
                                                                                                                                                                                                                                                           GCCCGCGCTCTCGTACCTCTCGCCGCGCACTCAGATCCTCTACGCCTTCGTCCGCGAGGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        dederiede a ce a ce de certre de certe de ce de certe de recent de
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1823
                                                                                                                                      2135
                                                                                                                                                                                                    2183
                                                                                                                                                                                                                                                                                                                                   2123
                                                                                                                                                                                                                                                                                                                                                                                                                                                                  . 2063
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1955
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              2003
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1844
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1883
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1784
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1664
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1715
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1604
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1655
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1544
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1535
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1424
                                                                                                                                                                                                                                                                     2075
                                                                                                                                                                                                                                                                                                                                                                                                     2015
```

```
RESULT 12
US-10-374-366-1
US-10-374-366;
Sequence 1, Application US/10374366
; Publication No. US20040014085A1
; Publication No. US20040014085A1
; Publication No. US20040014085A1
; Publication No. US20040014085A1
; Publicant IMPORVATION: METHOD FOR THE RECOMBINATION OF GENETIC ELEMENTS
; PILE REFERENCE: CL1794 US NA
; CURRENT APPLICATION NUMBER: US/10/374,366
; CURRENT FILING DATE: 2003-02-26
; PRIOR APPLICATION NUMBER: OS/360,279
; PRIOR PILING DATE: 2002-02-26
; PRIOR FILING DATE: 2002-02-26
; PRIOR FILING DATE: 2002-02-26
; SEQ ID NO 1
; LENGTH: 2151
```

8 8 8 8 8 8 8

Š

첫 유

CGACGA 1	Qy 999 CCACGACGTCTGCCGCCCCCCCCCGACGTCGAGGTCGAGGTCGCGCAACATCCGCACGCT 1058	QY 939 CTTGACGGCTCTCACGGTGGAGGCCATGGTCGGCCAGCAGGCTCGTTCGT	Oy 879 CGCCTCGATGGCGACCCTCAGTCTGCAGGCTCGCACATGCTCTCGCTCTCTCGCAGGC 938	Oy 819 CGAGGCAGTCGTCGGCCCGAAGGAGGTCTCGGTCTAGGCAACGGAACGGCCGTCTC 878	Oy 759 TTTGCACGAGGAACCGAGAAGATCATGTTTGCGCGCGAGGGCCATCTCGCTCTTTGGTCT 818	Qy 699 CAGCCGCTCTCGTACATCGCCGGCGCCATCACCGCTCAACGTTCAACGTTCAACGTTCAACGTTCAACGTTCAACGTTCAACGTTCAACGTTCAACGTTCAACGTTCAACGTTCAACGTTCAACGTTCAACGTTCAACGTTCAACGTTCAACGTTCAACCCGGAACAGCAAGGTTGCAACGTTCAACCCGGAACAGCAAAGGTTGCAACGTTCAACGTTCAACCCGGAACAGCAAAGGTTGCAACGTTCAACCCGGAACAGCAAAGGTTGCAACGTTCAACCCGGAACAGCAAAGGTTGCAACGTTCAACGTTCAACCCGGAACAGCAAAGGTTGCAACGTTCAACCCAACAACAACGTTCAACGTTCAACGTTCAACCCAACAACAACAACAACACTTCAACCCAACAACA	OY 639 GAACCACCGCATCACGCCCATCGTCCCCCTCCGGGGCTCCATCTCGGGCGTCGGGCGACCT 698	Db 579 GCTCACGCGTGGCCACTCGGCCGTCGTCGTCGTCGTCGTGAGGGGGTCACCAACCTTCTT 638	OY 519 CCTCGAGAACACGCTTCCGCTCGAGGTCGTCGGGGGGGCGCCATGGTCATCGGGGTCAACTC 578	Qy 459 CGAGCACCAGCTCTGCGGCGTGACGCCGACGTCCGYCTCGTCCTTCAGCGTCGGACGCGG 518	QY 399 TTTCGGTGGCTCGGCCGACACGAGGATCCAGAGTCAGCCTCCAGAAGGCGCTCAT 458	QY 339 CAAGAGCGTCGACTTCCTCAAGGCCCAGCTTCAGAACTCGGTCTACGGAGTCACCACGGG 398	Qy 279 CGCCGCAAGGGGGCAGGGTCCAGAACGACGACGAGATCCGCGCGCACGCGTCGA 338	Oy 219 CACCGACGTCGTCGAGGCTCAGCGGGTACAGCCTCACCGTCGACGTTCTGGGGGCC 278	QY 159 CGATGGCCACGCGCGCACCAGTCGCAGCTCGAGAATGGTGCAGGAGCTCCTCAGCGACCC 218	Qy 99 CGCCGCTCCGACCAAGTCGGCTGCGGGCCCCACTTCGGCTCTCGGCCGCACGGCCCGCACGCCCGCACGCCGCACGCCGCACGCCGC	Query Match 49.4%; Score 1195; DB 16; Length 2151; Best Local Similarity 73.9%; Pred. No. 5.9e-282; Matches 1564; Conservative 1; Mismatches 526; Indels 24; Gaps 3;	; TYPE: DNA ; ORGANISM: Rhodosporidium glutinis US-10-374-366-1
Qy 2124 GAGCAACGTCTCGCGCATCTACGAGGCCATCAAGGACGGCCGCATCAACGTCCTCGT 2183	Qy 2064 GCTCGGCGTGCAGGCGCGGCGGCGACGTGTTTGTCGGCGTGCAGGAGACGATCGG 2123	Db 1956 GCCCGCGCTCTCGTACCTCTCGCCGCGCACTCAGATCCTCTACGCCTTCGTCCGCGAGGA 2015	1944 GECCATUTUCGUCAGGUCAGGUCTTUTGGUGAGGUCTTUTGGUGAGGUTTUTGGAGGUTTUTGGUGAGGUTTUTGGUGAGGUTTUTGGUGAGGUTTUTGGUGAGGUTTUTGGUTGG	1884 GCCTTCTGCCAACGTTACCCTTACTGCCGTGGAAGGTTGGCCGGGAAAGTTGCCTTGGCCGAGAA	1024 OCCUPANTAMENTALICATION AND ANALYSIS AND	1704 CHANGHICHANGHAGUCETCHACHAGUGTCTIGGAGCG 1705 CHANGHAGUGTCTCCHACHAGUGTCTCGGGCAGACGACGTCGTCGGGCCTCGTCCC 1725 GAAGGTGAACAAGACGTCGCCAAGCGCCTCGAGCAGACCTAACTCGTACGACCTCCTCCCC 1824 CCCCTTCCCCACACCGCTTCTCCCCAAGCGCAACTCGTACGACCTACGTCCTCCCC	1716 CCTCCAGCAGCACCTCGGCATTGGCCTCGAGTCA	1605	1596 GECLANGRAGICCITICICUICITICIGCACGCACCIGIRACIGCAGGCICCAGGCCGT	1536 AGAGATGGGCACCAGGCGTCAACTCGCTCCCTCTCATCTCCGCGCGCG	1476 TGCTTAGGAGTGGGGCACCTTGCCAACCCGGTCACTACCTTGCTCCAGCCGGC	1416 COTCGCTGCCGAGGGACCGTCGCTCAACTATCAGGCAAGGGCTTGGACATTCACATCGC	1356 CAACTTCACGCAGTGCACCAGATTGCTCAACGCTGCCATGAACCGCGGCCTTCGTG	1296 GTCGGCTGTCTCGATTTCGATGGAAAGACACGGCTCGCACTCGCCCTCATCGGCAAGCT	1236 CGACAACCCGCTCCTCGACGTCGAGAACAAGCAGACCGCGACGGCGCAACTTCCAGGC	11/9 COTCAGGACCTCATTCACGCCCACGGCCTCCTCACCGAGGCCGGCC	1119 GAGCATTCTTGCCACGACCGCTACCCGCTCCGCACGTCGCCTCAGTTCCTCGGCCCGCT	1005 CTTCGAGGGAAGCCGCTTTGCTGTCCACCATGAGGAGGAGGTCAAGGTCAAGGACGACGA

1665 CATCGACCAGCACTITIGGCTCUGCCATGACCGGCTCGAACCTGCGGACGTACGACCTCGAGCC 1823	585 CARCCACGCCATCACCCCATCGTCCCCCCCCCGCGCACCATCTCTCTGCGTCGGGCGACCT 644  699 CAGCCCGCTCTCGTACATCGCCGGCCCATCACCGGTCACCCCGACGTCAAGGTTCACGT 758	Db Qy
16	o51 o	Db Qy
1545 GTCCTCCGCGCGATGAGCTCGACCTCAAGAAGAAGCAGTTCGACCCACTCTACTCCACCTCTACTCCAT 1604 1656 CGACCTCCGCGCGATGAGCTCGACCTTCAAGAAGAAGCAGTTCGACCGCTTCTCCCGACTCT 1715	19 CCTCGAGAACGCTTCCGCCTCGAGGTCGTCCGCGGCCATGGTCATCCGCGTCAACTC 57 CTTCGAGAACTCGTTCCGCTCGAGGTCGTCGCGGCCATGGTCATCCGCGCTCAACTC 65 TCTCGAGAACTCGCTTCGAGGTTGTTCGCGGCGCCATGACAATCCGCGTCAACAG 52	da VC
96	518	ac AC
1476 TGCTTACGCTTCGGAGCTCGGCCACCTTGCCAACCCCGGTCACACACA	b⊢	AC AC
CCTCGCTGCCGAGGACCCGTCGCTCAACTAICACGCAGGCAGGCTCGACATCACATICACATICACATTGCAAGGCCTCGACATTGCAAGGCCTCGACACATGCAAGGCCTCGACACATGCAAGGCCTCGACACATGCAAGGCCTCGACATGCCACGCTGC	39 CAAGAGCGTCGACTTCCTCAAGGCCCAGCTTCAGAACTCGGTCTACGGAGTCACCACGGG 398	y Y
OS CAACTTCACGCAGCTCACCGAGATGCTCAACGCCGGCATGAACCGCGGCCTCCCCTGCCTG	279 CGCCCGCAAGGGGCGAGGGTCCAGAACGACGACGAGGAGTCCGCGCACGCGTCGA 338	λy Jb
S. G. COSTIGLE COME. COMPANY OF THE STATE OF	219 CACCGACGACGTCGGCGGGTCAGCGGGTACAGCCTCACCGTCCGT	¥ ¥
1236 CGACCACCCCTCCTCGACGTCGAGACAAGAAACAAGACCCACAACGACCAACCTCTCATCGACGACGACGAGACTAGAGACAAGACTTCGCACGACGGCGAATTTCCAAGGC 1244	CGATGGCCACGGCGCACCAGCTCGAGATCGTGCAGGAGCTCCTCAGCGACCC 218	<i>ע</i> ל לנ
79 CGTCAGGACTGATTCACGCCTACTLCACTCTCCACCAGAGAACAAAAAAAAAA	GETGCGGGCCCACTTCGGCTCTCCGCCGCACGCCCT 158	ੱ <b>ਂ</b> ਪੇਂ
9 GGCATTCTTCGCCAGGACCGCTACCGCCTCCGCACGCTCGCT	49.4%; Score 1195; DB 16; Length 2151; Similarity 73.9%; Pred. No. 5.9e-282; 4; Conservative 1; Mismatches 526; Indels 24; Gaps 3;	Query Best Matcl
	QY LENGTH: 2151 TYPE: DNA ORGANISM: Rhodosporidium glutinis D.374-366-9	SEQ ID NO 9 LENGTH: 215 TYPE: DNA ORGANISM: R
999 CCACGACGTCTGCCGCCCCGCACCCCGGCAGGTCGAGGTCGCGCGCAACATCCGCACGCT 1058	PILING DATE: 2002-02-26  OF SEQ ID NOS: 203  Db  RE: PatentIn version 3.2	PRIOR FILE NUMBER OF SOFTWARE:
939 CTTGACGGCTCTCACGGTGGAGGCCATGGTCGGCCAGCAGGGCTCGTTCGCGCCGGTTCAT 998	4,366	FILE R CURREN CURREN
879 CGCCTCGATGGCGACCCTCAGTCTGCACGACTCGCACATGCTCTCGCTCCTCTCGCAGGC 938	OF NO. 0520040014065A1  NEORMATION: T: Tang, Xiao-Song  T: Milano, Joseph  Db  THENTON ACTUAL FOR THE DECOMPTINATION OF CENETIC PLEMENTS	GENERAL APPLIC APPLIC
819 CGAGGCAGTCGTCCTCGGCCCGAAGGAGGGTCTCGGTCTGGTCAACGGAACGGCCGTCTC 878	02y 9, Application US/10374366 Db	ESULT 13 JS-10-374-366-9 Sequence 9, App
759 TITGCACGAGGAACCGAGAAGATCATGITTGCGCGCGAGGCCATCTCGCTCTTTGGTCT 818	CAAGATGCTCGCTTA	)b 2
	076 CTCGAACGTCTCCAAGATCTACGAGGCCATCAAGTCGGGCAGGATCAACAACGTCCTCCT 2135 Db	

39 CAAGAGOGTOGACTTCCTCAAGGCCCAGCTTCAGAACTCGGTCTACGGAGTCACCACGGG	Qy 279 CGCCGCAAGGGGCAGGGTCCGCGTCCAGAACGACGACGAGGATCCGCGCACGCGTCGA 338	Qy 219 CACCGACGACGTCGAGGTCAGGGGGTACAGGCTCACCGTGCGTG	Qy 159 CGATGGCCACGCCGCGCACCAGTGGCAGCTCGAGATCGTGCAGGAGCTCCTCAGCGACCC 218	Qy 99 CGCCGCTCCGACCAAGTCGGGTGCGGGGCCCCACTTCGGCTCTCCGCCGCACGCCCGGCCT 158	Query Match 49.4%; Score 1195; DB 16; Length 2151; Best Local Similarity 73.9%; Pred. No. 5.9e-282; Matches 1564; Conservative 1; Mismatches 526; Indels 24; Gaps 3;	; LENGTH: 2151 ; TYPE: DNA ; ORGANISM: Rhodosporidium glutinis US-10-374-366-13	; PRIOR FILING DATE: 2002-02-26 ; NUMBER OF SEQ ID NOS: 203 ; SOFTWARE: PatentIn version 3.2 ; SEQ ID NO 13		; GENERAL INFORMATION: ; APPLICANT: Tang, Xiao-Song ; APPLICANT: Milano, Joseph ; APPLICANT: Milano, Joseph ; TITLE OF INVENTION: METHOD FOR THE RECOMBINATION OF GENETIC ELEMENTS	E CO	Db 2136 CAAGATGCTCGCTTA 2150	Db 2076 CTCGAACGTCTCCAAGATCTACGAGGCCATCAAGTCGGGCAGGATCAACAACGTCCTCCT 2135  OY 2184 CAAGATGCTCGCGTA 2198	Db 2016 GCTTGGCGTCAAGGCCGGCGAAGACGTCTTCCTCGGCAAGAAGAGGTGAACGATCGG 2075  OY 2124 GAGCAACGTCTGGGGATCTAAGAAGGCATCAAGGACGGCGCATCAACCACGTCCTCGT 2183	Db 1956 GCCCGCGCTCTCGTACCTCTCGCCGCGCGCGCACGA      Qy 2064 GCTCGGCGTGCAGGCGCCGCGCGCGCGGCGAGGA 2015      Qy 2064 GCTCGGCGTGCAGGCGCGCGCGGCGGTGTTTTGTCGGCGTGCAGCAGGACGATCGG 2123	2004	QY 1944 GGCCATCTCGCTCACGCGCGAGGTGCGCGAACCGCTTCTGGCAGAGACGCCGTCTTCGCAGGC 2003	1845 GTCGCTCTCGCTCGCCGCCGTCAACGCCTGGAAGGTCGCCGCCGCCGAGTC	Db 1785 GCGCTGGCAACGCTTACTCTTCGCCGCGGCGACCACGTCGATCAAGTCTCTGTCGAC 1844  OV 1884 GCCCTCTGCCAACGCTCACCTTAACTGCGTCAACGTCGAACGTCCGTC	Qy 1824 GCGCGCGCCCCCCGCGCGCGCCGCCGCCGCCGCCGCCCCC
Qy	מם עס	d d	) da 4	\$	d dd y	QV	da VQ	Qy Db	dd 40	dg VQ	Qy dd	D 49	Db CY	. pb .	da da	Qy	γ <sub>Q</sub> γ	gb Vy	Db
1416 CCTCGCTGCCGAGGACCCGTCGCTCAACTATCACGGCAAGGGCTTGGACATTCACATCGC 1475	1356 CAACTTCACGCAGTGCACCGAGTTGCTCAACGCTGCCATGAACCGCGGCCTGCCT	G C	.236 GENCACCUTTCATCGATGGATAGGATAGATGGCAACCTCGCGCGCAACTTCCAGGC	1.79 CONTRAGACATGACACCCCTACTCGACTCTCTCCCCCGAGAACAACACGAGGACACACGAGGACACACACGAGGACACACAC	9 GGCATTCTTCGCCAGGACCGCTACCCCCTCGCCCACTTCCTCGGCCCGCT	9 CCTTTCCGGCTCGTCGTTTGCCGTTGAGCACGAGGAGGAGGTCAAGGTCAAGGACGACGA 	999 CCACGACGTCTGCCGCCGCACCCCGGCCAGGTCGAGGTCGCGCGCAACATCCGCACGCT 1058	939 CTTGACGGCTCTCACGGTGGAGGCCATGGTCGGCCAGCAGGGCTCGTTCGCGCCGTTCAT 998	879 CGCCTCGATGGCGACCCTCAGTCTGCACGACTCGCACATGCTCTCGCTCTCGCAGGC 938	819 CGAGGCAGTCGTCCTCGGCCCGAAGGAGGGTCTCGGTCTGGTCAACGGAACGGCCGTCTC 878	759 TTTGCACGAGGGAACCGAGAAGATCATGTTTGCGCCGCGAGGCCATCTCGCTCTTTGGTCT 818	699 CAGCCGGCTCTCGTACATCGCCGGCGCCATCACCGGTCACCCCGACGTCAAGGTTCAACGT 758	SAACCACCGCATCACCCCATCGTCCCCCTCCGCGGCTCCATCTCGGCGTCGGGCGACCT		465 TCTCGAGAACTCGCTTCCCCCTCGAGGTTGTTCGCGGGCGCCATGACAATCCGCGTCAACAG 524	405 CONSCANDAÇÃO CULTO CONTROL TURBO CONTROL STA CONTR	CARGENCEAGETCTGCGGCGTGACGCCGACGTCCGYCTCGTCCTTCAGCGTCGGACGCGG	39 TITUGG TO THE TOTAL THE TOTAL ASSOCIATION OF THE TOTAL ASSOCIATION O	o oo

```
RESULT 15
US-10-374-366-23
(Sequence 23, Application US/10374366
) Publication No. US20040014085A1
(GENERAL INFORMATION:
APPLICANT: Tang, Xiao-Song
APPLICANT: Milano, Joseph
TITLE OF INVENTION: METHOD FOR THE RECOMBINATION OF
FILE REFERENCE: CL1794 US NA
CURRENT APPLICATION NUMBER: US/10/374,366
CURRENT FILING DATE: 2003-02-26
CURRENT FILING DATE: 2003-02-26
CURRENT FILING DATE: 2003-02-26
CURRENT FILING DATE: 2003-02-26
                  PRIOR APPLICATION NUMBER: 60/360,279
PRIOR FILING DATE: 2002-02-26
NUMBER OF SEQ ID NOS: 203
SOFTWARE: PatentIn version 3.2
SEQ ID NO 23
LENGTH: 2151
TYPE: DNA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1845
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1884
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1785
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1824
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1665
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1605
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1545
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1425
                                                                                                                                                                                                                                                                                                                                                                                                                                2136
                                                                                                                                                                                                                                                                                                                                                                                                                                                                         2184
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    2016
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1956
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                2004
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1896
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1944
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1764
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1656
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1596
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1485
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1536
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1365
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CGAGGTCAAGAAGGCGCTCAACAAGCGTCTCGAGCAGACGACGACGACGTACGACCTCGAGCC 1823
                                                                                                                                                                                                                                                                                                                                                                                                                                CAAGATGCTCGCTTA 2150
                                                                                                                                                                                                                                                                                                                                                                                                                                                                CAAGATGCTCGCGTA 2198
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   CTCGAACGTCTCCAAGATCTACGAGGCCATCAAGTCGGGCAGGATCAACAACGTCCTCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GAGCAACGTCTCGCGCGATCTACGAGGCCCATCAAGGACGGCCGCATCAACCACGTCCTCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    GCTCGGCGTGCAGGCGCGCCGCGCGACGTGTTTGTCGGCGTGCAGCAGGAGACGATCGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        GCCCGCGCTCTCGTACCTCTCGCCGCGCACTCAGATCCTCTACGCCTTCGTCCGCGAGGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                GECCATCTCGCTCACGCGCGAGGTGCGCCAACCGCTTCTGGCAGACGCCGTCTTCGCAGGC 2003
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GTC-----GCTCTCGCTCGCCGCCGTCAACGCCTGGAAGGTCGCCGCCGCCGAGTC 1895
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GCCCTCTGCCAACGTCACCCTTACTGCCGTCAACGCGTGGAAGGTTGCCTCGGCCGAGAA 1943
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               GCGCTGGCACGACGCCTTCTCCTTCGCCGCCGCCGGCACCGTCGTCGAGGTCCTCCTCGTCGAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   GCGCTGGCACGACGCCTTCTCGTACGCGACCGGCACCGTCGTCGAGCTCCTCTCGTCCTC 1883
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   GAĂĞĞTGĂĂCĂĂĞĂCĞCTCGCCĂĂĞCĞCCTCĞĂĞCĂĞCCĂĂCCCĂACTCĞTĂCĞĂCCTCĞTCCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      CATCGACCAGCACTTTGGCTCCGCCATGACCGGCTCGAACCTGCGCGACGAGCTCGTCGA 1724
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               CCTCCAGCAGCACCTCGGCACTGGCCTCGACGTCA------ACGCACTTGCGCT 1763
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CGACTTGCGCGCGACCGAGTTCGAGTTCAAGAAGCAGTTCGGCCCAGCCATCGTCTCGCT 1664
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CGACCTCCGCGCGATGGAGCTCGACTTCAAGAAGCAGTTCGACCCGCTTCTCCCCGACTCT 1715
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          GICCAACGACGTCCTTTCTCTCCTCCTCGCCACCCACCTCTACTGCGTTCTCCAAGCCAT 1604
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   GGCCAACGACGTCCTTTCTCCCTTCTCGCCCTGGCACCTGTACTGCACGCTCCAGGCCGT 1655
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                AGAGATGGGCAACCAGGCCGTCAACTCGCTCGCTCTCATCTCCGCGCGCCGCACTGCCGA 1595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 GGCGTACACCTCGGAGTTGGGGACACCTCGCCAACCCTGTGACGACGCATGTCCAGCCGGC 1484
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       TGCTTACGCTTCGGAGCTCGGCCACCTTGCCAACCCGGTCACTACCTTCGTCCAGCCCGC 1535
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CCTCGCGGCCGAAGACCCCTCGCTCTCCTACCACTGCAAGGGCCTCGACATCGCCGCTGC 1424
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GGCCATCTCGCTCACCCGCCAAGTCCGCGAGACCTTCTGGTCCGCCGCGCGTCGACCTCGTC
                                                                                                                                                                                                               OF GENETIC
                                                                                                                                                                                                                 ELEMENTS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      2135
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            2183
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    2075
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               2123
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          2015
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1955
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1844
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1784
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            ; ORGANISM: Rhodosporidium glutinis US-10-374-366-23
                        Ś
                                                                 밁
                                                                                                       Ś
                                                                                                                                                    밁
                                                                                                                                                                                      Ş
                                                                                                                                                                                                                                       맒
                                                                                                                                                                                                                                                                         Ş
                                                                                                                                                                                                                                                                                                                      밁
                                                                                                                                                                                                                                                                                                                                                               8
                                                                                                                                                                                                                                                                                                                                                                                                            밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                δõ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Query Match
Best Local Similarity
Matches 1564; Conserv
                           1059
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       165
                                                                                                                                                                                                                                                                                                                                                                   819
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      525
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              579
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         465
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               519
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            405
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   459
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           345
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      399
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 285
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         339
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    225
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             279
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      105 GCACCTGCCCACAACCCAGGTCACGCAGGTCGACATCGTCGAGAAGATGCTCGCCGCGCCC
                                                                                                                                                                                             939
                                                                                                                                                                                                                                       825
                                                                                                                                                                                                                                                                                                                           765
                                                                                                                                                                                                                                                                                                                                                                                                              705
                                                                                                                                                                                                                                                                                                                                                                                                                                                       759
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 645
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  585 CAACCACGGCATCACCCCCATCGTCCCCCCTCCGCGGCACCATCTCTGCGTCGGGCGACCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           639 GAACCACCGCATCACGCCCATCGTCCCCCTCCGCGGCTCCATCTCGGCGTCGGGCGACCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               159 CGATGGCCACGCCGCACCAGTCGCAGCTCGAGATCGTGCAGGAGCTCCTCAGCGACCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            4
5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  9
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      CTTGACCCGCGCCACTCGGCTGTCCGCCTCGTCCTCGAGGCGCTCACCAACTTCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               ccrceaeaacacecrrceccrceaeercerceceeececareercarececercaacre
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            TTTCGGTGGCTCGGCCGACACGAGGACTGAGGATGCAGTCAGCCTCCAGAAGGCGCTCAT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GACCGACTCGACGCTCGAACTCGACGGCTACTCGCTCAACCTCGGAGACGTCGTCTCGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CACCGACGACGTCGTCGAGCTCAGCGGGTACAGCCTCACCGTCGACGTTGTCGGCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CGTCGCATCCGCAAAGCAGGCTGTCAATGGCGCCTCGACCAACCTCGCAGTCGCAGGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  ceccecroceaccaaeroeceeecccaerroeecrocecececacececececece
                                                                                                                                                                                                                                                                                                                                                                                                                                                  TTTGCACGAGGAACCGAGAAGATCATGTTTGCGCGCGAGGCCATCTCGCTCTTTGGTCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               GCTCACGCGTGGCCACCACCTCGGCCTCGTCCTTGAGGCGCTCACCAACTTCTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         TCTCGAGAACTCGCTTCCCCTCGAGGTTGTTCGCGGCGCCATGACAATCCGCGTCAACAG 524
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             ATTTGGCGGATCCGCAGACACCCGCACCGAGGACGCCATCTCGCTCCAGAAGGCTCTCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 CAAATCGGTCGAGTTCTTGCGCTCGCAACTCTCCATGAGCGTCTACGGCGTCACGACTGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CAAGAGCGTCGACTTCCTCAAGGCCCAGCTTCAGAACTCGGTCTACGGAGTCACCACGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CECCCGCAAGGGGCGCAGGGTCCGCGTCCAGAACGACGACGAGATCCGCGCACGCGTCGA 338
  TCACGACGTCACGCGCCCTCACCCGACGCAGATCGAAGTCGCGGGAAACATCCGCAAGCT
                                                                                                     CCACGACGTCTGCCGCCCGCACCCCGGCCAGGTCGAGGTCGCGCGCAACATCCGCACGCT
                                                                                                                                                      geneacedecaneacedenceaadeceanedneedeceacecedecicennececnicen
                                                                                                                                                                                             crreaceccrcrcaceereeaeeccareerceeccaeeaecrcerrcececccrrcar 998
                                                                                                                                                                                                                                                                     CGCCTCGATGGCGACCCTCAGTCTGCACGACTCGCACATGCTCTCGCTCCTCCGCAGGC
                                                                                                                                                                                                                                                                                                                             CGAGCCCGTCGTCCTCGGCCCGAAGGAGGGTCTCGGTCTCGTCAACGGCACCGCCGTCTC
                                                                                                                                                                                                                                                                                                                                                          CGAGGCAGTCGTCCTCGGCCCGAAGGAGGTCTCGGTCTGGTCAACGGAACGGCCGTCTC
                                                                                                                                                                                                                                                                                                                                                                                                              CTCTCCTCTCCTACATTGCAGCGGCCATCAGCGGTCACCCGGACAGCAAGGTGCACGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CAGCCCGCTCTCGTACATCGCCGGCGCCATCACCGGTCACCCCGACGTCAAGGTTCACGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            ceaecaccaecrerecerrecerrecerrecacrecarrecerrecerrece
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  , CGCGAGGAAGGGCAGGCCTGTCCGCGTCAAGGACAGCGACGAGATCCGCTCAAAGATTGA
                                                                                                                                                                                                                                          AGCATCGATGGCCACCCTCGCTCTGCACGACGCACACATGCTCTCGCTCCTCTCGCAGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           49.4%; ilarity 73.9%; Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Score 1195; DB 16;
pred. No. 5.9e-282;
l; Mismatches 526;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Length 2151;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             24;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Gaps
```

644

758

1004

944

938

824 878 764 818 704

884

578 464 518

638

584

458

344

404

398

284

224 278 164 218

158

w

104

Š 밁 Š Ķ ¥ ᅜ

岁

片 ¥

¥

ž

岁

Ŋ

႘

¥ 岁

岁

용 Ϋ́ 뮹 Š 片 Š 片

Š

	2183 2135	2124 GAGCAACGTCTCGCGCATCTACGAGGCCATCAAGGACGGCCGCATCAACCACGTCCTCGT	
	2123 2075	064 GCTTGGCGTGCAGGCGCGCGCGGGGACGTTTTGTCGGCGTGCAGCAGGAGACGATCGG	
	2063	2004 GCCGGCGCACGCATACCTCTCGCCGCGCGCGCGCGCGCTCCTGTACTCGTTCGT	
	2003 1955	TCGCTCACGCGCGAGGTGCGCAACCGCTTCTGGCAGACGCCGTCTTCGCAGGC	
	1943 1895	1884 GCCCTCTGCCAACGTCACCCTTACTGCCGTCAACGCTGGAAAGGTTGCCTCGGCCGAGAA	
	1883 1844	TCCTCTCGTCCTC	
	1823 1784	1764 CGAGGTCAAGAAGGCGCTCAACAAGCGTCTCGAGCAGACGACGAACGTACGACCTCGAGCC	
	1763 1724	ACGCACTTGCGCT	
	1715 1664	656 CGACCTCCGCGCGATGGAGCTCGACTTCAAGAAGCAGTTCGACCCGCTTCTCCCGACTCT	
	1655 1604	.596 GGCCAACGACGTCCTTTCTCTCTT	
	1595 1544	1536 AGAGATGGGCAACCAGGCCGTCAACTCGCTCGCTCTCATCTCCGCGCGCG	
	1535 1484		
	1475 1424	1416 CCTCGCTGCCGAGGACCCGTCGCTCAACTATCACGGCAAGGGCTTGGACATTCACATCGC	
. •	1415 1364	(1)	
	1355 1304	1296 GTCGGCTGTCCGATTTCGATGGAGAAGACCAGGCTCGCACTCGCCCTCATCGGCAAGCT	
	1295 1244		
	1235 1184	1179 CGTGGAGGACATGATGCACGCCTACTCGACTCTCTCGCTCG	
	1178 1124	19 GGGCATTCTTCGCCAGGACCGCTACCCGCTC	
	1064	.005 CCTCGAGGGAAGCCGCTTTGCTGTCCACCATGAGGAGGAG	

밁

8

B

유 왕

망

당	δ
2136	2184
CAAGATGCTCGCTTA	CAAGATGCTCGCGTA
2150	2198

Search completed: September 12, 2004, 12:22:08 Job time : 1583.32 secs

```
Minimum
Maximum
                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Post-processing: Minimum Match 0%
Maximum Match 100%
Listing first 45 summaries
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Scoring table:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Sequence:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Title:
Perfect score:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             OM nucleic -
                                                 Result
No.
                                                                                                                                                                                                                                                                                                                                                                                                                                                        Database
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Total number
                                                                                                  Pred. No. is the number of results predicted by chance to have a score greater than or equal to the score of the result being printed, and is derived by analysis of the total score distribution.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     DB
400.2
386.2
289.2
268
                                                  Score
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   seq
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    о<del>г</del>
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             nucleic search, using sw model
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   length: 0
length: 2000000000
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    hits satisfying chosen parameters:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          IDENTITY_NUC Gapext 1.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      September 11, 2004, 13:17:03; Search time 9123.4 Seconds (without alignments)
7917.733 Million cell updates/sec
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    US-09-939-408A-12
2419
                                                                                                                                              27513289 segs, 14931090276 residues
                                                  Query
Match
                                                                                                                                                                                                                                                                                                                                                                                                                                                        EST:*
16.5
16.0
12.0
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           ctcctgcctcactctaaccc.....
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           GenCore version 5.1.6
Copyright (c) 1993 - 2004 Compugen Ltd.
                                                                                                                                                                                                                                                         em_htc:*
gb_est1:*
gb_est1:*
gb_htc:*
gb_htc:*
gb_est3:*
gb_est4:*
gb_est5:*
em_gss_htm:*
em_gss_htm:*
em_gss_htm:*
*
                                                                                                                                                                                                                                                                                                                                                                               em_estov:*
em_estpl:*
em_estro:*
                                                                                                                                                                                                                                                                                                                                                                                                                       em_esthum:*
em_estin:*
                                                                                                                                            em_gss_phg:*
em_gss_vrl:*
gb_gssl:*
gb_gss2:*
                                                                                                                                                                          em gss pln: *
em gss vrt: *
em gss fun: *
em gss mam: *
em gss mus: *
em gss rod: *
em gss phg: *
                                                                                                                                                                                                                                                                                                                                                                                                                                             em_estba:*
                                                                                                                                                                                                                                                                                                                                                                                                                em estmu:*
                                                  Length DB
2598
2299
1864
859
                                                    ij
AY103647
AY106831
AY104679
CB632830
                                                                                  SUMMARIES
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           .gagttcaaaaaaaaaaaaaa
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       55026578
 AY103647 Zea mays
AY106831 Zea mays
AY104679 Zea mays
CB632830 OSIIEb11F
                                                    Description
```

0 0 0 0 0 0 0

ALIGNMENTS

0 0 0 0 0 0 0 0 0 0

45 25	2	2	2	2	0	9	8	7 2	6 2	5	4 2	3 2	2		0 2!	9 2!	8 2!	7 25	6 25	5 26	4 26	3 26	2 26	_	0	9 26	3 26	7 26	26	O.	26	26	26	,	26	26	26	26	26	26
53.2	.2	ა დ	ω œ	ა. 8	.0	4.6	00	00	. 00	4. B	B	. 8	. 8	255	4	45	w	**	~		#2	Oi	w	10	2	١٠		۷,	٠,	ω	ы, Н	ω	<u>.</u>	٠, ب	יי	יי	_	<u> </u>	<u> </u>	~ -
10.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0																٠.		:	:	:	:	:	:
865 1	45	67	20	45	62	41 :	28	47 :	45	45	45	45	40	46 1	64 1	61	46	37	53	56	51 1	55 1	54 1	09 1	52 1	07 1	55 1	58	57 1	58 1	58 1	33 1	)1	50 1	57 1	57 1	54 1	39 1	100	99
14 CB6	4 CB	4 CB	4 CB	4 CB	4 CB	4 CB	4 CB	4 CB	4 CB	4 CB	4 CB6	4 CB	4 CB6	4 CB6	4 CB6	4 CBC	4 CB6	9 002	4 CB6	4 CB6	4 CB6	4 CB6	4 CB6	4 CB6	4 CB6	4 CB6	1 CB6	1 CB6	1 CB6	1 CB6	1 CB6	CB6	CB6	CB6	CB6	L CB6				
N	57	4	64	48	w	65	28	40!	w	17	11(	05.5	10:	17(	922	04	485	971	419	44	610	57	093	997	596	349	938	302	784	770	361	347	168	312	150	5	971	387	5	5202
0	0	O				0	0			0			0			C			. 0	. 0	. 0	ı C	10	10	10	) C	ın	n	a	O	വ	Ω	n	ı C	10	a C	10	a C	10	i G
B64292	B67572	W	86664	B6448	B6463	86765	B6728	B6440	B6653	B6517	865110	B65059	B65102	864170	86692	86504	86448	320971	36441	36544	36661	36/5/	365093	362997	364965	364345	364938	367302	367784	364770	367361	364847	365168	365812	36515C	304655	354447	35488	00/00/00/00/00/00/00/00/00/00/00/00/00/	B645202
OSJNEb03	OSJNEel					0			0	C		0	0	C			C	0	C	c	· c	) C	0	C	0	c	C	0	0	Q	0	O	C	C	C	0	O	c	Ç	OSJNEDO6M

0 000 000000000000000

RESULT 1
AX103647
LOCUS
DEFINITION
ACCESSION
VERSION
KEYWORDS
SOURCE
ORGANISM Eukaryota; Viridiplantae; Streptophyta; Embryophyta; Tracheophyta; Spermatophyta; Magnoliophyta; Liliopsida; Poales; Poaceae; PACCAD clade; Panicoideae; Andropogoneae; Zea. clade; Panicoideae; Andropogoneae; Zea. classes 1 to 2598)

Hainey, C.F., Dolan, M., Miao, G.H., Vogel, J.M., Whitsitt, M.S., Arthur, L.W., Hanafey, M., Morgante, M. and Tingey, S.V. Maize Mapping Project/DuPont Consensus Sequences for Design of Overgo Probes
Unpublished (2002)
2 (bases 1 to 2598) Zea mays Zea mays Direct Submission
Submitted (25-APR-2002) Maize Mapping Project, University of Missouri, Columbia, MO 65211, USA
If you are interested in getting corresponding physical clones, these are publicly available from ZmDB and may be found by BLAST searching at MSL, maizemap.org; ZmDB, www.zmdb.iastate.edu; TIGR, www.tigr.org; or NCBI, www.ncbi.nlm.nih.gov. When the source of the Zea mays PCO142084 mRNA AY103647 AY103647.1 GI:21206725 Coe, AY103647 2598 bp sequence. mRNA linear HTC 16-OCT-2002

JOURNAL REFERENCE AUTHORS TITLE

COMMENT

JOURNAL

REFERENCE AUTHORS

TITLE

```
Ş
                                                                                                                    В
                                                                                                                                                                       δ
                                                                                                                                                                                                                                                        8
                                                                                                                                                                                                                                                                                                               Ş
                                                                                                                                                                                                                                                                                                                                                                                               B
                                                                                                                                                                                                                                                                                                                                                                                                                                                  ΛÕ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               g
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    δ.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                뫄
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Дb
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                3
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ъ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Query Match
Best Local Similarity
Matches 1095; Conserv
                                                          892
                                                                                                                        818
                                                                                                                                                                                      832
                                                                                                                                                                                                                                                           761
                                                                                                                                                                                                                                                                                                                             772
                                                                                                                                                                                                                                                                                                                                                                                                                                                                    712
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      641
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           652
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 581
                                                                                                                                                                                                                                                                                                                                                                                               701
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  592
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                521
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      532
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           485
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             472
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  425
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                412
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      365
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    358
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         305
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           298
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  244
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       185
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         184
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  maize cDNA sequences is either Virginia Walbot, Stanford or P
Schnable, Iowa State, then clones may be requested from ZmDB:
www.zmdb.iastate.edu.
       ACCCTCAGTCTGCACGACTCGCACATGCTCTCGCTCCTCTCGCAGGCCTTGACGGCTCTC
                                                                                                                                                                    CTCGGCCCGAAGGAGGGTCTCGGTCTGGTCAACGGAACGGCCCTCTCCGCCTCCGATCGCC
                                                                                                                                                                                                                                                                                                                                                                                    TACATCGCCGGCCTCATCACGGGCCGCCCCAACGCCGCAGGCCGTCACCGTCGACGGGAGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ACGCCCATCGTCCCCTCCGCGGCTCCATCTCGGGCGTCGGACCTCAGCCCGCTCTCG
                                                                                                                                                                                                                                                        AAGGTGGACGCCGCCGAGGCGTTCAAG--
                                                                                                                                                                                                                                                                                                                  ACCGAGAAGATCATGTTTGCGCGCGAGGCCATCTCGCTCTTTGGTCTCGAGGCAGTCGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  TACTCCGGCATCCGCTTCGAGATCCTCGAGGCCCATCACGAAGCTGCTCAACACCGGTGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CACTCGGCCGTCGTCGTCGTCGTTGAGGCGCTCACCAACTTCTTGAACCACCGCATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      CTGCCGTCGGAGGTCACCCGCGCGACGATGCTGGTGCGCATCAACACCCTCCTCCAGGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           GCCGGA--
                                                                                                             CTCAACCCCAAGGAGGGCCTCGCCATCGTCAACGGCACGTCCGTGGGCTCCGCGCTCGCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                             TACATCGCCGGCGCCATCACCGGTCACCCCGACGTCAAGGTTCACGTTTTGCACGAGGGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               AGCCCCTGCCTGCCGCTCCGGGGCACCATCACCGCGTCGGGCGACCTGGTCCCGCTCTCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CTTCCGCTCGAGGTCGTCGCGGGGGCGATCGTCATCCGCGTCAACTCGCTCACGCGTGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  TGCGGCGTGACGCCGACGTCCGYCTCGTCCTTCAGCGTCGGACGCGGCCTCGAGAACACA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GCCGACACGAGGACTGAGGATGCAGTCAGCCTCCAGAAGGCCGCTCATCGAGCACCAGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CTCGACTGCATCGCCACGGCGGCGACATCTACGGCGTCACCACCGGCTTCGGCGCACC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GTCGCCGTCGAGCTCGACGAGGAGGCCCGCCCCGCGTCAAGGCCAGCAGCAGCGAGTGGATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GTCCGCGTCCAGAACGACGACGAGATCCGGCGACGACGTCGACAAGAGGCGTCGACTTCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       GGGTACAGCCTCACCGTCCG-----TGACGTTGTCGGCGCCCCCCCCAAGGGGCGCAGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       савстоваватовтвельнование степеннов составование степеннов стене степеннов ст
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    TCCCACCGCCGCACCAAGGACGGGCCCGCGCTCCAGGTCGAGCTGCTCAGGCATCTCAAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         AAGGCCCAGCTTCAGAACTCGG-----TCTACGGAGTCACCACGGGTTTCGGTGGCTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GGTTCCACCCTCCGCGTCGGCCAGGTGGCCGCCGTCGCCCAAGGACGCGTCCGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CACCTGGACGAGGTGAAGCGCATGGTGGCGCAGGCCCGGCAGCCCGTGGTCAAGATCGAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       16.5%;
ilarity 53.4%;
Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        /note="this sequence is part of a project of EST assemblies resulting from the application of public contigs to seed DuPont contigs; this resource was assembled by DuPont as part of a collaboration for the overgo addressing of BACs in conjunction with the Maize Mapping Project"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Library"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  /db_xref="MaizeDB:638378"
/db_xref="taxon:4577"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Location/Qualifiers
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           organism="Zea mays"
|mol_type="mRNA"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            clone
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              lib="Maize Mapping Project/DuPont Cornsensus
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       <u>,</u>
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Score 400.2; DB 11; Pred. No. 6.3e-45; 0; Mismatches 903;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                ----ATCTTCGGCACCGGCAGCGACGGGCACACG
                                                                                                                                                                                                                                                    -ATCGCCGGCATCGAGGGCGGCTTCTTCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   53;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Pat
                                           951
                                                                                                                                                                               891
                                                                                                                                                                                                                                                                                                                  831
                                                                                                                                                                                                                                                                                                                                                                                        760
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       651
                                                                                                                                                                                                                                                    817
                                                                                                                                                                                                                                                                                                                                                                                                                                                             771
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           700
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             711
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  640
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           591
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                520
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              531
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         471
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         411
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    484
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           424
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              364
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                357
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     304
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           297
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            244
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              243
                                                          Ş
                                                                                                                                                                                                     8
          밁
                                                                                                                                          밁
                                                                                                                                                                                                                                                                              B
                                                                                                                                                                                                                                                                                                                                            Ş
                                                                                                                                                                                                                                                                                                                                                                                                                     맑
                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               ğ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 멂
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               망
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                          1892
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1712
                                                                         1965
                                                                                                                                                                                                                                                                                                                                                                                                                        1772
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1729
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1472
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1609
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1532
          1952
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1669
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1592
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1549
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1489
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1412
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1352
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1372
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1292
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1312
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1232
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1252
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1172
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1192
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1112
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1132
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1055
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1072
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1012
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               998
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             878
                                                   GAGCGGGAGCCCTCCGTGTTCTCCAAGATCACCAGGTTCGAGGAGGAGCTCCGCGCGGTG
   crececheshesiesasseceseceses resectas de consecuentes es estados es estados estados estados en entre en estados en entre en estados en entre en estados en entre entre en entre en entre entre en entre en entre en entre entre entre en entre entre en entre en
                                                                                                                                                                                                     TACTGCCGTCAACGCGTGGAAGGTTGCCTCGGCCGAGAAGGCCATCTCGCTCACGCGCGA
                                                                                                                                                                                                                                                                          CCGCTGATGCAGAAGCTGCGCGCCGTGCTGGTGGACCACGCCCTCAGCAGCGGCGACGCG
                                                                                                                                                                                                                                                                                                                                        TACGCGA-CCGGCACCGTCGAGCTCCTCTCGTCGTCGCCCTCTGCCAACGTCACCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CTCGAGGAGAACATCAAGGCGTCGGTGAAGAACACCGTGACCCAGGTGGCCAAGAAGGTG
                                                                                                                                                                                                                                                                                                                                                                                                             AGCGCCATCGACCGCGAGGCCGTGTTCACGTACGCGGAGGACGCGGCCAGCGGCAGCCTG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                               AAGCGTCTCGAGCAGACGACGTACGACCTCGAGCCGCGCGCACGACGCCTTCTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CTGACCATGAACCCCTCGGGGGAGCTCTCCAGCGCCCCCTTCAGCGAGAAGGAGCTGATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   CTCGGCACTGGCCTCGACGTCAA----CGCACTTGCGCTCGAGGTCAAGAAGGCGCTCAAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             ATGGAGCTCGACTTCAAGAAGCAGTTCGACCCGCTTCTCCCGACTCTCCTCCAGCAGCAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CTGAAGCTCATGTCGTCCACCTACATCGTGGCGCCTGTGCCAGGCCGTGGACCTGCGCCAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        caeeccercaacreecreecrerencesececececaereceaecaaccaaccaaccae
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          GAGCTCCAGTACCTGGGCAACCCCATCACCAACCACGTGCAGAGCGCGGAGCAGCACAAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GAGCTCGGCCACCTTGCCAACCCGGTCACTACCTTCGTCCAGCCCGCAGAGATGGGCAAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             AACCCCAGCCTGGACTACGGCTTCAAGGGCACCGAGATCGCCATGGCCTCCTACTGCTCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               GACCCGTCGCTCAACTATCACGGCAAGGGCTTGGACATTCACATCGCTGCTTACGCTTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GACGTCGAGAACAAGCAGACCGCGCACGGCGGCAACTTCCAGGCGTCGGCTGTCTCGATT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 cirrererected acceptance of the contract of th
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CAGGACGTGĂĂCTCCCTGGGCCTCGTCTCGGCCAGGAAGACCGCCGAGGCGATCGACATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                TCCGAGCTCGTCAACGAGTTCTACAACAACGGGCTCACCTCCAACCTGGCCGGCAGCCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  TCGATGGAGAAGACCAGGCTCGCACTCGCCCTCATCGGCAAGCTCAACTTCACGCAGTGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               GACGTCCACCGCGGCAAGGCGCTGCACGGCGGCAACTTCCAGGGCCACCCCCATCGGCGTG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CAGGACAGGTACGCGCTCCGCACGTCGCCGCAGTGGGCCCCCCAGATCGAGGTCATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CAGGACCGCTACCCGCTCCGCACGTCCCCTCAGTTCCTCGGCCCGCTCGTGGAGGACATG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              TCGTTTGCCGTTGAGCACGAGGAGGAGGAGGAGGAGGACGACGAGGGCATTCTTCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           TCCATGGACAACGCCCGCCTCGCCATCGCCAACATCGGCAAGCTCATGTTCGCGCAGTTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      CGCGCCGCCAAGTCCATCGAGCGCGAGGTCAACTCCGTGAACGACAACCCGGTCATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CGCCGCACCCCGGCCAGGTCGAGGTCGCGCGACACATCCGCACGCTCCTTTCCGGCTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       TCCTT----CATGAAGCAGGCCAAGAAGTTGAACGAGCTGGACCCGCTGCTGAAGCCCCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CAC---
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              TTCTGCGAGGTCATGAACGGCAAGCCCGAGTACACGGACCACCTGACCCACAAGCTGAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            GCCACCGTGATGTACGACGCCAACGTCCTGGCCGTCCTGTCGGAGGTCCTGTCCGCCGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CACCCGGGGTCCATCGAGGCCGCCGCCATCATGGAGCACATCCTGGATGGCAGC 1054
                                                                                                                                                                                                     1964
                                                                 2024
                                                                                                                                   1951
                                                                                                                                                                                                                                                                                                                                        1904
2010
                                                                                                                                                                                                                                                                          1891
                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1845
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1771
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1728
                                                                                                                                                                                                                                                                                                                                                                                                             1831
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1785
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1711
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1668
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1488
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1311
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1591
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1608
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1548
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1471
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1411
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1428
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1351
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1371
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1291
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1251
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1171
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1111
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1131
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1231
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1071
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1011
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  937
```

	563 TEATECGEGTEAACTEGGTGACGGGGGGGCACTEGGCCGTCGGTCGTCGTCGTTGAGG 622	Qy
	503 TCAGCGTCGACGCCTCGAGAACACGCTTCCGCTCGAGGTCGTCCGCGGCGCCATGG 562 Db	Qy db
1256 ACCACGTCCAGAGCGGGGGGAGCAGCACGACGTCGTCTCTCTC	Cuery Match  16.0%; SCOTE 386.2; DB 11; Dength 2299;  Best Local Similarity 55.1%; Pred. No. 5e-43;  Matches 950; Conservative 0; Mismatches 753; Indels 22; Gaps 9;  Qy	Query Best I Matche
1520 CCTTCGTCCAGCCCGCAGAGATGGGCAACCAGGCCGTCAACTCGCTCG		OKIGIN
1460 TGGACATICACATCCCTGCTTACGCTTCGGAGCTCGGCCAACCCTTGCCAACCCGGTCACTA 1519	assembled by Dupont as part of a collaboration for the overgo addressing of BACs in conjunction with the Maize Mapping Project"	
1403 GCCTGCCTTGGTGCTCGCTGCCGAGGACCCGTCGCTCACCATTACAGGCAAAAAGGCTT 1459	Library"  /note="this sequence is part of a project of EST  /note="this sequence is part of a project of EST  assemblies resulting from the application of public  assemblies resulting from the application of public  Db	
1343 TCATCGGCAAGCTCAACTTCACGCAGTGCACCGAGTTGCTCAACGCTGCCATGAACCGCG 1402	/mol type="maNA" / Qy /mol type="maNA" / Qy /db_xref="MaizeDB:638374" /db_xref="taxon:4577"	
1283 GCAACTTCCAGGCGTCGCCTCGCATTTCGATTGCAGAGACCCAGGCTCGCCCTCGCCCC 1342		FEATURES Source
23 ACAACACGACGACCACACCCGCTCCTCGACGTCGAGACCAGCGGGACCGCGCCACGCCG	searching at MSL, maizemap.org; ZmDB, www.zmdb.iastate.edu; TIGR, www.tigr.org; or NCBI, www.ncbi.nlm.nih.gov. When the source of the maize cDNA sequences is either Virginia Walbot, Stanford or Pat Schnable, Iowa State, then clones may be requested from ZmDB:	
896 AGTGGCTCGGCCCAGATCGAGGTCATCCGCGCCGCCAAGTCCATCGAGCGAG	Missouri, Columbia, MO 65211, USA  If you are interested in getting corresponding physical clones,  these are muhicula available from ZmDB and may be found by BLAST	COMMENT
1163 AGTTCCTCGGCCCGCTCGTGGAGGACATGATGCACGCCTACTCGACTCTCTCGCTCG	Direct Submission Submitted (25-APR-2002) Maize Mapping Project, University of Qy	TITLE JOURNAL
1103 AGGTCAAGGACGACGAGGGGCATTCTTCGCCAGGACCGCTACCCGCTCCGCACGTCGCCTC 1162	Unpublished (2002) 2 (bases 1 to 2299) Coe,E.H. Db	JOURNAL REFERENCE AUTHORS
1043 GCAACATCCGCACGCTCCTTTCCGGCTCGTTTGCCGCTTGAGCACGAGGAGGAGGTCA 1102	F., Do N., Ha Ping P	AUTHORS TITLE
983 CGTTCGCGCCGTTCATCCACGACGTCTGCCGCCACCCCGGCCAGGTCGAGGTCGAGGTCGAGGTCGAGGTCGAGGTCGAGGTCGAGGTCGAGGTCGAGGAGCACCATGGAGGCACCATGGAGGCACCATGGAGGCACGAGGAGCACCAAGCTCAAGCACCACCCGGGGTCCATGGAGGCCGCGG 778		REFERENCI
923 CECTCCTCTCGCAGGCCTTGACGGCTCTCACGGTGGAGGCCATGGTCGGCCAGCAGGAGCT 982		VERSION  KEYWORDS  SOURCE  ORGANISM
863 ACGGAACGGCCGTCTCCGCCTCGATGCCGACCTCAGTCTGCACGACTCGCACATGCTCT 922	AY106831 2299 bp mRNA linear HTC 16-OCT-2002 QY Zea mays PCO142079 mRNA sequence. Db	AY106831 LOCUS DEFINITION ACCESSION
803 TCTCGCTCTTTGGTCTCGAGGCAGTCGTCCTCGGCCCGAAGGAGGGTCTCGGTCTGGTCA 862	2191 CGGCAAGCCGC 2201 Qy	
485 ACGCGCAGGCCGTCACGGTTGACGGCAGGAAGGTGGACGCCGCGAGGCGTTCAAGGCGG 544	2205 GAGCAAGCCTC 2215 Db	Qy
425 CCGCGTCGGGCGACCTCCTCCCGCCTGTCCTACATCGCCGGCCTCATCACGGGGGCGTCCCA 484  743 ACGTCAAGGTTCACGTTTTGCACGAGGGAACCGAGAAGATCATGTTTGCGCGGAGGCCA 802	2145	dd VQ
CGCCGTCGGGCGACCTCAGCCCGCTTCGTACATCGCCGGCGCGATCACCCGGTCACCCCG		Db
623 CGCTCACCAACTTCTTGAACCACCACCATCACCCATCCCCCTCCGCGCTCCATCT 682	2011 GAACCGGATCGGGAGAGACGGTCGTTCCGCGTGTACCGCTTCGTGGGGAGGAGCTCGG 2070  2085 CGGGGACGTGTTGTCGGGCGTGCAGCAGGAGACGATCGGGAGGAGCAACGTCTA 2144  Db	& &
306 TCGTCCGCATCAACACCCTCCTCCAGGGCTACTCCGGCATCCGCTTCGAGATCCTCCGAGG 365	2084	γQ

Cornsensus

11;

Gaps

117

781 60 721 4 Maize

```
JOURNAL
REFERENCE
AUTHORS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            REFERENCE
AUTHORS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    ACCESSION
VERSION
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              RESULT 3
AY104679
LOCUS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 유 성
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      9
                                                                                       FEATURES
                                                                                                                                                                                                                                                                   COMMENT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             SOURCE
ORGANISM
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       8 B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         g
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      g
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        망
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              KEYWORDS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        DEFINITION
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ś
                                                                                                                                                                                                                                                                                                                  TITLE
JOURNAL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                           TITLE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1916
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1856
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   2111
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1796
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1736
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1757
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        2051
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1993
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1676
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1496
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1934
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1616
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1874
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1556
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1814
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1376
                                                                                               Direct Submission

Direct Submission

Submitted (25-APR-2002) Maize Mapping Project, University of Missouri, Columbia, MO 6521, USA

Missouri, Columbia, MO 6521, USA

If you are interested in getting corresponding physical clones, these are publicly available from ZmDB and may be found by BLAST searching at MSL, maizemap.org; ZmDB, www.zmdb.iastate.edu; TIGR, www.tigr.org; or NCBI, www.tigriord; when the source of the maize cDMA sequences is either Virginia Walbot, Stanford or Pat Schnable, Iowa State, then clones may be requested from ZmDB:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         AY104679
Zea mays PC0
AY104679
AY104679.1
HTC.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                Hainey,C.F., Dolan,M., Miao,G
Arthur,L.W., Hanafey,M., Morg
Maize Mapping Project/DuPont
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Zea mays
Zea mays
Bea mays
Zea mays
Eukaryota; Viridiplantae; Streptophyta; Embryophyta; Tracheophyta;
Spermatophyta; Magnoliophyta; Lilioppida; Poales; Poaceae; PACCAD
clade; Panicoideae; Andropogoneae; Zea.
                                                                                                                                                                                                                                                                                                                                                                         Coe, E.H.
                                                                                                                                                                                                                                                                                                                                                                                                                    Unpublished
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            TCGACCCCATGCTCGACTGCCTCAAGGAGTGGGACGGCAAGCCCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           ACCACGTCCTCGAAGATGCTCGCGTAAGGCCCGAGCAAGCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               TCAAGTCCCCCGGCGAGGAGTGCAACAAGGTGTTCCTGGCCCTCAGCGAGGGCAAGCTCA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             AGGAGACGATCGGGAGCAACGTCTCGCGCATCTACGAGGCCATCAAGGACGGCCGCATCA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    ACCCGCTGTACCGCTTCATCCGCCAGGACCTCGGCGCGTGTACCTGACCGGCGAGAAGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  TCGTGCGCGAGGAGCTCGCGTGCAGGCGCGCGCGACGTGTTTGTCGGCGTGCAGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      GCGTGGCCTTCGAGACCGGCGCGCCGCCGATCGCCAACAGGATCAAGGAGAGCCGGTCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        TOTTOGCAGGCGCGCGCACGCATACCTCTCGCC--GCGCACGCGCGTCCTGTACTCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            AGATCAACAGGTTCGAGGAGGAGGAGCTGCGCGAGGCGCTGCCCAGGGAGATGGAGGCCGCCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CGGCCGAGAAGGCCATCTCGCTCACGCGCGAGGTGC-GCAACCGCTTCTGGCAGACGCCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 TGGACCACGCCTCGCCAGCGGCGAGGCCGAGAGGACGCCAGCGCGTCCGTGTTCTCCA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     TCTCGTCCTCGCCCTCTGCCAACGTCACCCTTACTGCCGTCAACGCGTGGAAGGTTGCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ACCTCGAGCCGCGCTGGCACGACGCCTTCTCGTACGCGACCGGCACCGTCGTCGAGCTCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GCGCGCTTCAGCGAGAAGGCCCTGCTCACCGCCATCGACCGCGAGGCGGTGTACGGGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          TTGCGCTCGAGGTCAAGAAGGCGCTCAACAAGCGTCTCGAGCAGGACGACGACGTACG---
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GCTGCGTGATGGCGGTGGCCAGGAAGGTGCTGACCACCAGCCTCGGCGGCGACCTCCACA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CGCTTCTCCCGACTCTCCAGCAGCACCTCGGCACTGGCCTCGACGTCAACGCAC---
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ACTACGACGACCCCTGCAGCGCCAACTCGCCCCTGATGAAGAAGATCCGGGCCGTGCTGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CGCTGTGCCAGGCCGTGGACCTGCGCCACCTCGAGGAGAACCTCAAGAGCGCCGTCAAGA
                                                                                                                                                                                                                                                                                                                                                                                         oublished (2002)
(bases 1 to 1864)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     (bases 1 to 1864)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      PC0142078
/organism="Zea mays'
/mol_type="mRNA"
                                                              1. .1864
                                                                                    Location/Qualifiers
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       GI:21207757
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      mRNA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Miao,G.H., Vogel,J.M., Whitsitt,M.S.,
., Morgante,M. and Tingey,S.V.
DuPont Consensus Sequences for Design
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      sequence.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1864
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           đđ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              mRNA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              linear
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1960
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             2215
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              HTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              16-OCT-2002
                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Of.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1855
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1933
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1915
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                2170
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  2110
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1735
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1992
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1675
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1615
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1873
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        2050
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1555
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1813
     S
                                                      밁
                                                                                             δ
                                                                                                                                                         밁
                                                                                                                                                                                               δõ
                                                                                                                                                                                                                                                         В
                                                                                                                                                                                                                                                                                                    δ
                                                                                                                                                                                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                                                                                                                                                                       Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                   В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          맑
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          ORIGIN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Query Match
Best Local S
Matches 594
                                                                                                                                                                                                             1382
                                                                                                                                                                                                                                                                                                                  1322
                                                                                                                                                                                                                                                                                                                                                                                                                    1262
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1202
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1142
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1082
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1022
                                                                                                                                                                                                                                                                 653
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           473
                                                         773
                                                                                                                                                                                                                                                                                                                                                                   593
                                                                                                                                                                                                                                                                                                                                                                                                                                                                        533
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              415
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   355
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        298
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       962
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        238
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               902
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                178
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              842
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     118
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    782
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              662
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         722
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  594;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          \vdash
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Similarity
                                                                                                                                                                                                          AGACCAGGCTCGCACTCGCCCTCATCGGCAAGCTTCACCTCACGCAGTGCACCGAGTTGC . 1381
        ACCTTGCCAACCCGGTCACTACCTTCGTCCAGCCCGCAGAGATGGGCCAACCAGGCCGTCA
                                                                                                          TCAACTATCACGGCAAGGGCTTGGACATTCACATCGCTGCTTACGCTTCGGAGCTCGGCC
                                                                                                                                                                                                                                                              ACACCCGTCTCGCGCCGCCATCGGCAAGCTCATGTTCGCGCAGTTCTCGGAGCTGG
                                                                                                                                                                                                                                                                                                                                                                 GTGGCAÁGGCGCTCCÁCGGCGÁACTTCCÁGGGAACTCCCATCGGCGTGTCCÁTGGÁCÁ
                                                                                                                                                                                                                                                                                                                                                                                                                    ACAAGCAGACCGCCACGGCGCAACTTCCAGGCGTCGGCTGTCTCGATTTCGATGGAGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ACTCGACTCTCGCTCGAGAACAACACGACGACGACAACCCGCTCCTCGACGTCGAGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CCATGGTCGGCCAGCAGGGCTCGTTCGCGCCGTTCATCCACGACGTCTGCCGCCCCGCACC
                                                         TGGACTACGGCTTCAAGGGCGCCGAGATCGCCATGGCCTCCTACTGCTCGGAGCTCCAGT
                                                                                                                                                           TGAACGACTACTACAACAACGGCCTCCCGTCCAACCTGTCCGGCGGGGGGGAACCCCAGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CCAAGTCCATCGAGCGCGAGATCAACTCCGTCAACGACAACCCGCTCATCGATGTGTCCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           ACGCGCTCCGCACCTCCCCCCAGTGGCTGGGCCCGCAGATCGAAGTGATCCGCTTTGCCA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            ACCCGCTCCGCACGTCGCCTCAGTTCCTCGGCCCGCTCGTGGAGGACATGATGCACGCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                AGCTGGCCAAGAAGCTCGGCGAGCTTCGACCCGCTGATG--AAGCCGAAGCAGGACAGAT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               TTGAGCACGAGGAGGAGGTCAAGGTCAAGGACGACGAGGGCATTCTTCGCCAGGACCGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CCGGACAGATCGAGGCCGCCGCTATCATGGAGCACGTCCTGGAAGGCAGCTCGTACATGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CCGGCCAGGTCGAGGTCGCGCAACATCCGCACGCTCCTTTCCGGCTCGTCGTTTGCCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     TCATGACCGGCAAGCCCGAGTTCACCGACCACCTGACGCACAAGCTGAAGCAC---CACC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             TCTTCGAGGCCAACGTTCTCGCCGTCATGGCCGAGGTCATCTCCGCGGTGTTCTGCGAGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             AGGAGGGCCTCGCCATGGTCAACGGCACCGCCGTGGGCTCCGGCCTCGCCTCCACCGTGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 AGGAGGGTCTCGGTCTGAACGGAACGGCCGTCTCCGCCTCGATGGCGACCCTCAGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GCGCCGCCGAGGCGTTCAGGATCGCCGGCATCGAGCACGGGTTCTTCGAGCTGCAGCCCA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    TCATGTTTGCGCGCGAGGCCATCTCGCTCTTTGGTCTCGAGGCAGTCGTCCTCGGCCCGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   GCGCCATCACCGGTCACCCCGACGTCAAGGTTCACGTTTTGCACGAGGGAACCGAGAAGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             TGCCGCTCCGGGGCACCATCACCGCGTCGGGCGACCTCGTCCCGCTCTCATACATCGCCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         TCCCCCTCCGCGGCTCCATCTCGGCGTCGGGCGACCTCAGCCCGCTCTCGTACATCGCCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            recaceacrocacerecrocrocrocrocaces reaces of the contract of th
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        GCCTCATCACGGGCCGCCAGAACTCC---
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     /note="this sequence is part of a project of EST assemblies resulting from the application of public contigs to seed DuPont contigs; this resource was assembled by DuPont as part of a collaboration for the overgo addressing of BACs in conjunction with the Maize Mapping Project"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 /db_xref="MaizeDB:638373"
/db_xref="taxon:4577"
/clone_lib="Maize Mapping
Library"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        12.0%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               0
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Score 289.2; 1
Pred. No. 7.8e
0; Mismatches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Mapping Project/DuPont
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        - GTCGCGGTGGGCCCCCGACGCAGGAAGGTGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        8e-30;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               423;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              DB 11;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Indels
```

1498

832

1438

712

652

1261

532

592

1201

1141

472

1081

414

1021

297 961 237 901 177 841

```
RESULT 4
CB632830
LOCUS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  SOURCE
ORGANISM
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     JOURNAL COMMENT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        VERSION
KEYWORDS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ď,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ğ
                    Ś
                                                            밁
                                                                                             8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                              FEATURES
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       REFERENCE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               ACCESSION
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      DEFINITION
                                                                                                                                        Query Match
Best Local Similarity
Matches 514; Conserv
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             TITLE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     AUTHORS
                                                                                                                                                                                                                                                                                                                                                                                                                                                            source
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1013
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1679
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1619
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1559
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Tel: 520 626 3967

Fax: 520 621 9288

Email: http://genome.arizona.edu
PCR PRIMERS
POWARD: gta aaa cga cgg cca gtg
BACKWARD: gta aaa cgc tat gac cat g
Plate: 11 row: F column: 05
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     953
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                893
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         833
                      610
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1 (bases 1 to 859)

Jantasuriyarat, C., Lu,G., Gowda,M., Hatfield,J., Zhou,B., Mazur,E.

Rudrna,D., Dean,R., Soderlund,C., Wing,R. and Wang,G.

Large-scale identification of ESTs involved in the interaction between rice and Magnaporthe grisea

Unpublished (2003)

Contact: Rod Wing

Arizona Genomics Institute
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Oryza sativa (indica cultivar-group)
Oryza sativa (indica cultivar-group)
Oryza sativa (indica cultivar-group)
Eukaryota, Viridiplantae, Streptophyta, Embryophyta; Tracheophyta;
Spermatophyta, Magnoliophyta, Liliopsida; Poales; Poaceae;
Ehrhartoideae; Oryzeae; Oryza.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CB632830 mRNA linear EST 0 OSIIEb11F05.f OSIIEb Oryza sativa (indica cultivar-group) clone OSIIEb11F05 5', mRNA sequence.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         University of Arizona
Biological Sciences W
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           85721-0088, USA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CB632830.1 GI:29627819
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         TCCTGGGCAACCCGGTGACCAACCAACGTCCAGAGCGCGGAGCACGACAACCAGGACGTGA
                  GTCGTCCTTGAGGCGCTCACCAACTTCTTGAACCACCGCATCACGCCCATCGTCCCCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           ACGTGAAG 1020
                                                            CGGGCGGCCATGCTCGTGCGCATCAACACCCTCCTCCAGGGCTACTCCGGCATCCGGTTC
                                                                                                 ceceececexperioarcacercaacroecroecroecereeceaceacerceecerc
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                ACTTCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     TGACGTCCACGTTCCTGATCGCGCTGTGCCAGGCCATCGACCTGCGGCACCTCGAGGAGA 1012
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           TTCTCGCCTCGCACCTGTACTGCACGCTCCAGGCCGTCGACCTCCGCGCGATGGAGCTCG 1678
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                ACTCCCTGGGCCTCATCTCGTCCAGGAAGACCGCCGAGGCAGTGGACATCCTGAAGCTGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     ACTOGOTOGOTOTOATOTOCOGOGOGOCACTGOOGAGGOOAACGACGTCCTTTCTCTCC 1618
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 primer: gta aaa cga cgg
                                                                                                                                        Conservative
                                                                                                                                                                                                                                                                                              /db_xref="taxon:39946"
/clone="OSIIEb11F05"
/tissue_type="Laaf"
/dev_stage="3_week"
/lab_host="DH10B"
                                                                                                                                                                                                                                      /clone lib="OSIIEb"
/note="Vector: pBluescript II K!
XhoI; 24 hrs after innoculation
                                                                                                                                                                                                                                                                                                                                                                                               /organism="Oryza sativa (indica
/mol_type="mRNA"
/cultivar="IR36"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                          ocation/Qualifiers
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1686
                                                                                                                                                                                                                                                                                                                                                                                                                                                            .859
                                                                                                                                                         11.1%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           West, 448A,
                                                                                                                                                       Score 268; DB 1
Pred. No. 6e-27;
                                                                                                                                        Mismatches 345;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               cca
  ٠
0.
                                                                                                                                                                            DB 14;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Q
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Box 210088, Tucson,
                                                                                                                                                                                                                                          KS +; Site_1: EcoRI
on with Rice Blast (
                                                                                                                                                                                                                                                                                                                                                                                                                                       cultivar-group)"
                                                                                                                                                                              Length
                                                                                                                                        Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           EST 08-APR-2003
                                                                                                                                        9
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             ΑZ
                                                                                                                                                                                                                                          (I; Site 2:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             892
                        669
                                                              60
                                                                                                   609
                                                                                                                                                                                                                                                                                                  RESULT 5
CB645202/c
LOCUS
                                                                                                                                                                                KEYWORDS
SOURCE
                                                                                                                                                                                                                                                                                                                                                                                                                                   Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    멍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ₽
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            멂
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             닭
                                                                                   REFERENCE
                                                                                                                                                                                                                                        ACCESSION
                                                                                                                                                                                                                                                                             DEFINITION
                                                                                                                                                                                                                       VERSION
                                                              AUTHORS
                                                                                                                                                             ORGANISM
                                                                                                                                                                                                                                                                                                                                                                                                                                           1390
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1330
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1210
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1150
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1030
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1270
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1090
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        652
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     592
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               532
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         418
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            970
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    358
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           910
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              298
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      850
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             238
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   790
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             730
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             43
                                                                        CB645202

CB645202

CSUNEBO6M01.r OSJNEB Oryza sativa (japonica cultivar-group) cDNA clone OSJNEBO6M013', mRNA sequence.

CB645202

CB645202.1 GI:29640193

EST.

Oryza sativa (japonica cultivar-group)
Oryza sativa (japonica cultivar-group)
Oryza sativa (japonica cultivar-group)
Sukaryota; Viridiplantae; Streptophyta; Embryophyta; Tracheophyta
Spermatophyta; Magnoliophyta; Liliopsida; Poales; Poaceae;
Ehrhartoideae; Oryzaa; Oryza.

Tataguainanta (Conda M. Watfield T. Thom D. Marrier

Loses 1 to 866)
Jantasuriyarat,C., Lu,G., Gowda,M., Hatfield,J., Zhou,B., Mazu: Kudrna,D., Dean,R., Soderlund,C., Wing,R. and Wang,G.
Large-scale identification of ESTs involved in the interaction between rice and Magnaporthe grisea
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               GTCGAGGTCGCGCGAACATCCGCACGCTCCTTTCCGGCTCGTCGTTTGCCGTTGAGCAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   CGTGGCACCATCACCGCGTCCGGTGACCTGGTTCCTACATTGCCGGCCTCATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CGCGGCTCCATCTCGGCGTCGGGCGACCTCAGCCCGCTCTCGTACATCGCCGGCGCCCATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             GCGCTCCACGGCGGCAACTTCCAGGGCACCCCCATCGGTGTGTCCATGGACAACGCCCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               CTCTCGCTCGAGAACAACACGACGACGACAACCCGCTCCTCGACGTCGAGAACAAGCAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   GAGGAGGAGGTCAAGGACGACGAGGGCATTCTTCGCCAGGACCGCTACCCGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            ATCGAGGCCGCCGTCATCATGGAGCACATCCTCGCCGGGAGCTCGTT---CATGAGCCAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            GECCAGCAGGECTCGTTCGCGCCGTTCATCCACGACGTCTGCCGCCCGCACCCCGGCCAG 1029
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    GCCAACATCCTCGCCGTCCTGTCCGAGGTGCTCTCGGCGGTGTTCTGCGAGGTGATGAAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         TCGCACATGCTCTCGCTCTCCCAGGCCTTGACGGCTCTCACGGTGGAGGCCATGGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CTCGCCATCGTCAATGGCACGTCCGTGGGGTCGGCGCCTCGCGGCCACCGTGATGTTCGAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           GCGCGAGGCCATCTCGCTCTTTGGTCTCGAGGCAGTCGTCCTCGGCCCGAAGGAGGGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        ACCGGCCGCCCAACGCGCAGG---CCATCTCGCCCGACGGCAGGAAGGTGGACGCCGCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         ACCGGTCACCCCGACGTCAAGGTTCACGTTTTGCACGAGGGAACCGAGAAGATCATGTTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                GCCATGAACCGCGGCCTGCCTTCGTGCC 1417
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             CTCGCACTCGCCCTCATCGGCAAGCTCAACTTCACGCAGTGCACCGAGTTGCTCAACGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              ACCGCGCACGGCGAACTTCCAGGCGTCGGCTGTCTCGATTTCGATGGAGAAGACCAGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        ATCGAGCGCGAGGTCAACTCCGTGAACGACAACCCGGTGATCGACGTCCACCGCGGCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   CGCACGTCGCCGCAGTGGCTCGGCAGGTCATCCGCGCGCCGCCACCAAGTCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CGCACGTCGCCTCAGTTCCTCGGCCCGCTCGTGGAGGACATGATGCACGCCTACTCGACT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             GCCAAGAAGGTGAACGAGATGGACCCGCTGCTGAAGCCGAAGCAGGACAGGTACGCGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GGCAAGCCGGAGTACACCGACCACCTGACCCACAAGCTGAAGCAC---CACCCTGGGTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    AGTCTACACAACGGGCTGACCTCCAACC 859
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CTCGCCATCGCCAACATCGGCAAGCTCATGTTCGCGCAGTTCTCCGAGCTCGTGAACGAA 831
                                                                                                                        Embryophyta; Tracheophyta;
a; Poales; Poaceae;
```

1329 711 1089

474

531

969

357 909 849

297

789 180

23.7

417

1209

651

1269

1149

```
Ş
                          5
                                                               밁
                                                                                                5
                                                                                                                                    B
                                                                                                                                                                                                       В
                                                                                                                                                                                                                                 5
                                                                                                                                                                                                                                                                    đ
                                                                                                                                                                                                                                                                                                           8
                                                                                                                                                                                                                                                                                                                                                B
                                                                                                                                                                                                                                                                                                                                                                            Š
                                                                                                                                                                                                                                                                                                                                                                                                                     B
                                                                                                                                                                                                                                                                                                                                                                                                                                               5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  망
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       COMMENT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            ORIGIN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Matches 505;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Query Match
Best Local Similarity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         source
                                 1372
                                                                                                                                                                         1252
                                                                                                                                                                                                                                              1192
                                                                                                                                                                                                                                                                                                                 1132
                                                                                                                                                                                                                                                                                                                                                                                    1072
                                                                                                                                                                                                                                                                                                                                                                                                                                                          1012
331
                                                                                                                                       451
                                                                                                                                                                                                            511
                                                                  391
                                                                                                                                                                                                                                                                               571
                                                                                                                                                                                                                                                                                                                                                    628
                                                                                                                                                                                                                                                                                                                                                                                                                       685
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          745
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                892 ACCCTCAGTCTGCACGACTCGCACATGCTCTCGCTCCTCTCGCAGGCCTTGACGGCTCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        BACKWARD: gga aac agc tat gac cat
Plate: 06 row: M column: 01
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Email: http://genome.arizona.edu
PCR PRimers
FORWARD: gta aaa cga cgg cca gtg
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Tel: 520 626 3967
Fax: 520 621 9288
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   University of Arizona
Biological Sciences West, 448A, P.O.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Unpublished (2003)
Contact: Rod Wing
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  85721-0088,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Arizona Genomics Institute
TCCGAGCTCGTGAACGAGTTCTACAACAACGGGCTGACCTCCAACCTGGCCGGCAGCCGC
                               ACCGAGTTGCTCAACGCTGCCATGAACCGCGGCCTGCCTTCGTGCCTCGCTG----CCGAG
                                                                                                                                                                     GACGTCGAGAACAAGCAGACCGCGCACGGCGGCAACTTCCAGGCGTCGGCTGTCTCGATT 1311
                                                                                                                                                                                                          CGCGCCGCCACCAAGTCCATCGAGCGCGAGGTCAACTCCGTGAACGACAACCCGGTGATC
                                                                                                                                                                                                                                          ATGCAÇGCCTACTCGACTCTCTCGCTCGAGAACAACACGACGACGACAACCCGCTCCTC 1251
                                                                                                                                                                                                                                                                                                               CAGGACCGCTACCCGCACGTCGCCTCAGTTCCTCGGCCCGCTCGTGGAGGACATG 1191
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          TTCTGCGAGGTGATGAACGGCAAGCCGGAGTACACCGACCACCTGACCCACAAGCTGAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             GCCACCGTGATGTTCGACGCCAACATCCTCGCCGTCCTGTCCGAGGTGCTCTCGGCGGTG
                                                                                                    TCGATGGAGAAGACCAGGCTCGCACTCGCCCTCATCGGCAAGCTCAACTTCACGCAGTGC 1371
                                                                                                                                     GACGTCCACCGCGGCAAGGCGCTCCACGGCGGCAACTTCCAGGGCACCCCCATCGGTGTG
                                                                                                                                                                                                                                                                               CAGGACAGGTACGCGCTCCGCACGTCGCCAGTGGCTCGGCCCGCAGATCGAGGTCATC
                                                                                                                                                                                                                                                                                                                                                                                    TCGTTTGCCGTTGAGCACGAGGAGGAGGTCAAGGTCAAGGACGACGACGAGGCATTCTTCGC
                                                                                                                                                                                                                                                                                                                                                                                                                       CAC--
                                                                                                                                                                                                                                                                                                                                                                                                                                                       ceccecaccecaeccaesiceaesicecececaecaccaceciccitriceeecice
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             ACGGTGGAGGCCATGGTCGGCCAGCAGGGCTCGTTCGCGCCGTTCATCCACGACGTCTGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CTGAACCCCAAGGAAGGTCTCGCCATCGTCAATGGCACGTCCGTGGGGTCGGCGCTCGCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   crceeccceaaeearcrceercreercaaceaaceeccercrceecrceareece
                                                                                                                                                                                                                                                                                                                                                  TCGTT----CATGAGCCACGCCAAGAAGGTGAACGAGATGGACCCGCTGCTGAAGCCGAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       primer: gga aac agc_tat gac cat
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                     CACCCTGGGTCGATCGAGGCCGCCATCATGGAGCACATCCTCGCCGGGAGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              organism "Oryza sativa (
/mol_type="mRNA"
/cultivar="Nipponbare"
/db xref="taxon:39947"
/clone="OSUNEB06M01"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           /clone_lib="OSJNEb"
/note="Vector: pBluescript II KS +; Site_1: EcoRI;
/not; 24 hrs after innoculation with Rice Blast (Ch. 1)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               /tissue_type="Leaf"
/dev_stage="3_week"
/lab_host="DH10B"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Location/Qualifiers
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  USA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    11.0%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       0
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Score 266.8; DB 14;
Pred. No. 8.7e-27;
0; Mismatches 332;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             gtg
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      (japonica
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            ιQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Box 210088, Tucson,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      cultivar-group)"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        866;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     9
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             (Che Che 2:
                               1428
                                                                                                                                                                                                                                                                                                                                                                                    1131
                                                                                                                                                                                                                                                                                                                                                                                                                                                       1071
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1011
                                                                                                                                       392
                                                                                                                                                                                                          452
                                                                                                                                                                                                                                                                               512
                                                                                                                                                                                                                                                                                                                                                                                                                       629
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          989
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               951
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     891
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  806
```

```
REFERENCE
AUTHORS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       SOURCE
ORGANISM
ORIGIN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ś
                                                                                                                                                                                                                                                            FEATURES
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        COMMENT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       멍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  VERSION
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ACCESSION
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             DEFINITION
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CB676595/c
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 KEYWORDS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 TITLE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             JOURNAL
                                                                                                                                                                                                                                         source
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     σ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1609
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1549
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1489
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1429 GACCCGTCGCTCAACTATCACGGCAAGGGCTTGGACATTCACATCGCTGCTTACGCTTCG 1486
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1669 ATGGAG 1674
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             151
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           211
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       271 AÁCCCGAGCTTGGACTÁCGGGTTCAÁGGGCACCGÁGÁTCGCCATGGCCTCCTÁCTGCTCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  31
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              91
                                                                                                                                                                                                                                                       BACKWARD: gga aac agc tat gac ca
plate: 12 row: O column: 20
Seq primer: gga aac agc tat gac
Location/Qualifiers
                                                                                                                                                                                                                                                                                                                                    Tel: 520 626 3967
Fax: 520 621 9288
Email: http://genome.arizona.edu
PCR PRimers
FORWARD: gta aaa cga cgg cca gtg
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Jantasuriyarat, C., Lu, G., Gowda, M., Hatfield, J., Zh
Kudrna, D., Dean, R., Soderlund, C., Wing, R. and Wang,
Large-scale identification of ESTs involved in the
between rice and Magnaporthe grisea
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Oryza sativa (japonica cultivar-group)
Oryza sativa (japonica cultivar-group)
Eukaryota; Viridiplantae; Streptophyta; Embryophyta; Tracheophyta;
Spermatophyta; Magnoliophyta; Liliopsida; Poales; Poaceae;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CB676595 860 bp mRNA linear EST 09-3 OSJNEe12020.r OSJNEe Oryza sativa (japonica cultivar-group) clone OSJNEe12020 3', mRNA sequence.
                                                                                                                                                                                                                                                                                                                                                                                                                                                        Arizona Genomics Institute
University of Arizona
Biological Sciences West,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Unpublished (2003)
Contact: Rod Wing
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CB676595
CB676595.1
                                                                                                                                                                                                                                                                                                                                                                                                                                            85721-0088,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ehrhartoideae;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CTCGAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  crrrcrcrcrcrccrccacaccrcracracracaccrccaaccccrcaaccrccacccc
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             CAGGCCGTCAACTCGCTCGCTCATCTCCGCGCGCGCACTGCCGAGGCCAACGACGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           GAGCTCCAGTACCTCGCCAACCCCATCACCAACCATGTCCAGAGCGCGGAGCAGCACAAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           GAGCTCGGCCACCTTGCCAACCCGGTCACTTACCTTCGTCCAGCCCGCAGAGATGGGGCAAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CTCAAGCTCATGACCTCCACCTÁCATCGTCGCCCTGTGCCAGGCCGTCGACCTTCGCCAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             CAGGACGTGAACTCGCTGGGTCTCGTCTCGGCCAGGAAGACCCTGGAAGGCGGTGGACATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          (bases 1 to 860)
              /clone="OSJNBe12020"
/tissue_type="Jeaf"
/tissue_type="Jeaf"
/dev_stage="3_week"
/lab_host="DH10B"
/lab_host="DH10B"
/clone_lib="OSJNBe"
/clone_lib="OSJNBe"
/note="Wector: pBluescript II KS +; Sit
XhoI; 24 hrs after innoculation with Ri
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  26
                                                                                                                                                        /organism="Oryza sativa
/mol_type="mRNA"
/cultivar="Nipponbare"
/db_xref="taxon:39947"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    GI:29680320
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Oryzeae; Oryza.
                                                                                                                                                                                                                                                                                                                                                                                                                                                             448A, P.O. Box 210088, Tucson,
                                                                                                                                                                                                                                                                                                                     cat
                                                                                                                                                                                                                   (japonica cultivar-group)"
                                                                                                                                                                                                                                                                                                                 g
                                                                                                                                                                                                                                                                             ω
                Site_1: EcoRI; Site_2:
h Rice Blast (70-15)"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Zhou,B., Mazur,
19,G.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 EST 09-APR-2003
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1668
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1548
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1608
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           152
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                32
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             92
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       212
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ħ
```

Query Match Best Local Similarity

11.0%;

Score 266.6; DB 14; Pred. No. 9.2e-27; 0; Mismatches 329;

Indels Length 860;

9,

Gaps

ω ••

Matches

Conservative

```
RESULT 7
CB648876/c
LOCUS
                                                                                                                                                                                                       ACCESSION
VERSION
KEYWORDS
                                                                                                             SOURCE
ORGANISM
                                                                                                                                                                                                                                                                                                                                                                                                        DEFINITION
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1494
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1197
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1137
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1077
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1017
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1434
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1377
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1317
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1674
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1554
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1614
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1257
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   386
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     446
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 506
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          623
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       682
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   740
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       957
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          800
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   897
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       098
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 146
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   206
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     837
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     86
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   26
                                                                                                                                                                                                       CB648876 889 bp mRNA 1
OSJNEb12H22.r OSJNEb Oryza sativa (japonica clone OSJNEb12H22 3', mRNA sequence.
CB648876
CB648876.1 GI:29643869
EST.
Oryza sativa (japonica cultivar-group)
Oryza sativa (japonica cultivar-group)
Eukaryota; Viridiplantae; Streptophyta; Embryophyta; Tracheophyta;
Spermatophyta; Magnollophyta; Liliopsida; Poales; Poaceae;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   G 26
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 G 1674
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              TCTCCTTCTCGCCTCGCACCTGTACTGCACGCTCCAGGCCGTCGACCCTCCGCGCGATGGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       GGAGAAGACCAGGCTCGCACTCGCCCTCATCGGCAAGCTCAACTTCACGCAGTGCACCGA 1376
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                GCACCCGGCCAGGTCGAGGTCGCGCGCAACATCCGCACGCTCCTTTCCGGCTCGTCGTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   CGAGGTGATGAACGGCAAGCCGGAGTACACCGACCACCTGACCCACAAGCTGAAGCAC--
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 GGAGGCCATGGTCGGCCAGCAGGGCTCGTTCGCCGCCGTTCATCCACGACGTCTGCCGCCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CGTGATGTTCGACGCCAACATCCTCGCCGTCCTGTCCGAGGTGCTCTCGGCGGTGTTCTG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   CAGTCTGCACGACTCGCACATGCTCTCGCTCTCTCGCAGGCCTTGACGGCTCTCACGGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 CCCCAAGGAAGGTCTCGCCATCGTCAATGGCACGTCCGTGGGGTCGGCGCCCCCCCAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          GCTCATGACCTCCACCTACATCGTCGCCCTGTGCCAGGCCGTCGACCTTCGCCACCTCGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      CGTGAACTCGCTGGGTCTCGGCCAGGAAGACCCTGGAGGCGGTGGACATCCTCAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               CGTCAACTCGCTCGCTCATCTCCGCGCGCGCCACTGCCGAGGCCAACGACGTCCTTTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   CGGCCACCTTGCCAACCCGGTCACTACCTTCGTCCAGCCCGCAGAGATGGGCAACCAGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GAGCTTGGÁCTÁCGGGTTCAÁGGGCACCGÁGATCGCCÁTGGCCTCCTACTGCTCTGAGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GTCGCTCAACTATCACGGCAAGGGCTTGGACATTCACATCGCTGCTTACGCTTCGGAGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      GCTCGTGAACGAGTTCTACAACAACGGGCTGACCTCCAACCTGGCCGGCAGCCGCAACCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               GTTGCTCAACGCTGCCATGAACCGCGGCCTGCCTTCGTGCCTCGCTG---CCGAGGACCC 1433
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        GGACAACGCCCGTCTCGCCATCGCCAACATCGGCAAGCTCATGTTCGCGCAGTTCTCCGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CCACCGCGCAAGGCGCTCCACGGCGGCAACTTCCAGGGCACCCCCATCGGTGTGTCCAT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CGAGAACAAGCAGACCGCGCACGGCGAACTTCCAGGCGTCGGCTGTCTCGATTTCGAT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CGCCACCAAGTCCATCGAGCGCGAGGTCAACTCCGTGAACGACAACCCGGTGATCGACGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CGCCTACTCGACTCTCGCTCGAGAACAACACGACGACGACAACCCGCTCCTCGACGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   CAGGTACGCGCTCCGCACGTCGCCGCAGTGGCTCGGCCCGCAGATCGAGGTCATCCGCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      CCGCTACCCGCTCCGCACGTCGCCTCAGTTCCTCGGCCCGCTCGTGGAGGACATGATGCA 1196
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              TGCCGTTGAGCACGAGGAGGAGGTCAAGGTCAAGGACGACGAGGGCATTCTTCGCCAGGA 1136

    - CÁCCCTGGGTCGATCÁGGCCGCCGTCATCATGGAGCACATCCTCGCCGGGAGCTCGTT

                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CCCGAAGGAGGTCTCGGTCTGGTCAACGGAACGGCCGTCTCCGCCTCGATGGCGACCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          - CATGAGCCACGCCAAGAAGGTGAACGAGATGGACCCGCTGCTGAAGCCGAAGCAGGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                       linear
                                                                                                                                                                                                                                                                                                                                                                                                                   cultivar-group)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                       EST 08-APR-2003
                                                                                                                                                                                                                                                                                                                                                                                                                             CDNA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1316
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1076
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1016
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1256
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 801
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 624
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              956
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1553
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1493
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             327
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               387
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            447
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             507
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    567
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1673
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               207
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            267
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              683
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 REFERENCE
AUTHORS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                JOURNAL COMMENT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   δÃ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               á
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           FEATURES
                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ORIGIN
                                                                                                                                                                                                            Š
                                                                                                                                                                                                                                                                                                                                                                                                                   Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Query Match
Best Local Similarity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              TITLE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Matches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       source
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1078
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1138
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1018
                                                                                                                                                                                                                                                                                                                                                                                                                             1198
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             838
                                                                                                                             445
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 565
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             623
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    682
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 739
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    958
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   799
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    859
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      502;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Tel: 520 626 3967

Fax: 520 621 9288

Email: http://genome.arizona.edu
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1 (bases 1 to 889)

Janttsuriyarat, C., Lu, G., Gowda, M., Hatfield, J., Zhou, B., Mazui Janttsuriyarat, C., Lu, G., Gowda, M., Hatfield, J., Zhou, B., Mazui Kudrna, D., Dean, R., Soderlund, C., Wing, R. and Wang, G.

Large-scale identification of ESTs involved in the interaction between rice and Magnaporthe grisea
Unpublished (2003)

Contact: Rod Wing
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Ehrhartoideae; Oryzeae; Oryza.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        University of Arizona
Biological Sciences W
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           BACKWARD: gga aac agc tat gac
Plate: 12 row: H column: 22
Seq primer: gga aac agc tat ga
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Arizona Genomics Institute
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             FORWARD: gta aaa cga cgg
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  PCR PRimers
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        ссвалевлентстветстветсильсь в постородительной постородительного по
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GAGGCCATGGTCGGCCAGGAGGGCTCGTTCGCGCCCGTTCATCCACGACGTCTGCCGCCCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             grgarierricialeccalearecricies estecraries de des contra de la contra del la contra de la contra del la con
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    вссеттвавсь сваввавава в постав в п
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 GAGGTGATGAACGGCAAGCCGGAGTACACCGACCACCTGACCCÁCAAGCTGAAGCAC---
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      AGTCTGCACGACTCGCACATGCTCTCGCTCTCGCAGGCCTTGACGGCTCTCACGGTG
                               GAGAAGACCAGGCTCGCACTCGCCCTCATCGGCAAGCTCAACTTCACGCAGTGCACCGAG
                                                                                                                             CACCGCGGCAAGGCGCTCCACGGCGGCAACTTCCAGGGCACCCCCATCGGTGTGTCCATG
                                                                                                                                                                                                                                 GAGAACAAGCAGACCGCGCACGGCGCCAACTTCCAGGCGTCGGCTGTCTCGATTTCGATG
                                                                                                                                                                                                                                                                                                                               GCCACCAAGTCCATCGAGCGCGAGGTCAACTCCGTGAACGACAACCCGGTGATCGACGTC
                                                                                                                                                                                                                                                                                                                                                                                                                        AGGTACGCGCTCCGCACGTCGCCGCAGTGGCTCGGCCCGCAGATCGAGGTCATCCGCGCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               CGCTACCCGCTCCGCACGTCGCCTCAGTTCCTCGGCCCGCTCGTGGAGGACATGATGCAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  --CATGAGCCACGCCAAGAAGGTGAACGAGATGGACCCGCTGCTGAAGCCGAAGCAGGAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               CACCCTGGGTCGATCGAGGCCGCCGCCATCATGGAGCACATCCTCGCCGGGAGCTCGTT-
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        caccecescaserceaesices en caceces en caceces en concentration de la concentration de l
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    ,8800
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            /organism="Oryza sativa (
/mol type="mRNA"
/culTivar="Nipponbare"
/db xref="taxon:39947"
/clone="OSJNEb12H22"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      /tissue type="leaf"
/dev stage="3 week"
/lab_host="DH10B"
/clone_lib="OSUNED"
/note="Vector: pBluescript II KS +; S
Xhol; 24 hrs after innoculation with
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Location/Qualifiers
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    USA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                11.0%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            .889
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   West,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      0;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Score 265.6; DB 14;
Pred. No. 1.3e-26;
0; Mismatches 329;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        cca
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   448A,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     gac
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    gtg
cat
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           cat
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   P.O.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        (japonica
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    ω
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ŋ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          DB 14;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Box
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             210088,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             cultivar-group)"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Site_1: EcoF
n Rice Blast
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               , 688
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           EcoRI; Si
last (Che
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      9;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             ΑZ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1197
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1137
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1077
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1017
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  897
                                                                                                                                             386
                                                                                                                                                                                                                                                                                                                                               446
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                506
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  566
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    624
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                683
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             740
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 957
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               800
```

w ••

Ş

밁

뮍 Š

Ś

8 멍 Š 밁 Ś 밁 Ś 밁 Ş 밁 Ş 밁 Ş В Ş 밁 Š 밁 Ś В á 맑 8

멼

ω

```
RESULT 8
CB649712/c
LOCUS
                                   ORIGIN
                                                                                                                                                                                                                                                        FEATURES
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        SOURCE
                                                                                                                                                                                                                                                                                                                                                                                                                                                              COMMENT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        REFERENCE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   DEFINITION
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ъ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    DЬ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ДЬ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    KEYWORDS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     VERSION
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    ACCESSION
   Query Match
                                                                                                                                                                                                                                                                                                                                                                                                                                                                            JOURNAL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             TITLE
                                                                                                                                                                                                                                       source
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1555
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1495
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1435
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1378
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1615
                                                                                                                                                                                                                                                                                                                                Contact: Rod Wing
Arizona Genomics Institute
University of Arizona
Biological Sciences West, 448A,
85721-0088, USA
Tel: 520 626 3967
Fax: 520 621 9288
Email: http://genome.arizona.ec
PCR_PRimers
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         145
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         205
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  325
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                385
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               85
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Oryza sativa (japonica cultivar-group) oryza sativa (japonica cultivar-group) Eukaryota, Viridiplantae, Streptophyta, En Spermatophyta, Magnoliophyta, Liliopsida, Ehrhartoideae, Oryzeae, Oryza.
                                                                                                                                                                                                                                                                  FORWARD: 9ta asa cga cgg cca gtg
BACKWARD: 9ga asc agc tat gac cat
Plate: 13 row: M column: 21
Seq primer: gga asc agc tat gac ca
                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Jantasuriyarat,C., Lu,G., Gowda,M., Hatfield,J., 2k Kudrna,D., Dean,R., Soderlund,C., Wing,R. and Wang, Large-scale identification of ESTs involved in the between rice and Magnaporthe grisea
Unpublished (2003)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          UB649712 864 bp m
OSJNEb13M21.r OSJNEb Oryza sativa (j
Clone OSJNEb13M21 3', mRNA sequence.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   CB649712.1 GI:29644705
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            TCGCTCAACTATCACGGCAAGGGCTTGGACATTCACATCGCTGCTTACGCTTCGGAGCTC 1494
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           GACAACGCCGTCTCGCCATCGCCAACATCGGCAAGCTCATGTTCGCGCGCAGTTCTCCGAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CTCCTTCTCGCCTCGCACCTGTACTGCACGCTCCAGGCCGTCGACCTCCGCGCGATGGAG 1674
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        GTGAACTCGCTGGGTCTCGGCCCAGGAAGACCCTGGAGGCGGTGGACATCCTCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    GGCCACCTTGCCAACCCGGTCACTACCTTCGTCCAGCCCGCAGAGATGGGCAACCAGGCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               CTCGTGAACGAGTTCTACAACAACGGGCTGACCTCCAACCTGGCCGGCAGCCGCAACCCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CTCATGACCTCCACCTACATCGTCGCCCTGTGCCAGGCCGTCGACCTTCGCCACCTCGAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      GICAACTCGCTCGCTCATCTCCGCGCGCGCGCACTGCCGAGGCCAACGACGTCCTTTCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 AGCTTGGACTACGGGTTCAAGGGCACCGAGATCGCCATGGCCTCCTACTGCTCTGAGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           TIGCTCAACGCTGCCATGAACCGCGGCCTGCCTTCGTGCCTCGCTG---CCGAGGACCCG 1434
                                                                                                                                                         /organism="Oryza sativa (
/mol type="mRNA"
/cultivar="Nipponbare"
/db xref="taxon:39947"
/clone="OSJNEb13M21"
                                                             /tissue_type="Leaf"
/dev_stage="3 week"
/lab_host="DH10B"
/clone_lib="OSUNED"
/clone_lib="OSUNED"
/note="Vector: pBluescript II KS
XhoI; 24 hrs after innoculation
                                                                                                                                                                                                                                                        Location/Qualifiers
                                                                                                                                                                                                                                           . 86
   11
   .
0%
                                                                                                                                                                                                                                                                                                                                                                                                            West, 448A,
   Score
   265.4;
                                                                                                                                                                                                                                                                    gac cat
                                                                                                                                                                                                                                                                                                                                                  . edu
                                                                                                                                                                                                                                                                                                                                                                                                              P.O.
                                                                                                                                                                                                                        (japonica
                                                                                                                                                                                                                                                                                                g
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             mRNA linear EST 08-1 (japonica cultivar-group)
 BG
                                                                                                                                                                                                                                                                    ω
                                                                                                                                                                                                                                                                                                                                                                                                              Box 210088,
                                                                              ઢ
 14;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Embryophyta; Tracheophyta; a; Poales; Poaceae;
                                                                 with
                                                                                                                                                                                                                     cultivar-group) "
 Length
                                                               Site_1: EcoRI; Site_2:
n Rice Blast (Che
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Zhou, B., ing, G.
                                                                                                                                                                                                                                                                                                                                                                                                            Tucson,
 864;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        interaction
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            EST 08-APR-2003
                                                                                                                                                                                                                                                                                                                                                                                                              ΑZ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Mazur, E.,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CDNA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1614
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    146
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            26
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1554
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        98
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 206
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               266
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             326
ACCESSION
VERSION
KEYWORDS
SOURCE
                                                                                                         RESULT 9
CB643557/c
                                                                              DEFINITION
                                                                                                                                                                          밁
                                                                                                                                                                                              δ
                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                Ş
                                                                                                                                                                                                                                                                                                В
                                                                                                                                                                                                                                                                                                                         Ş
                                                                                                                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                                                                                        Š
                                                                                                                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 뭕
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Matches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Best Local Similarity
                                                                                                                                                                                                      1672
                                                                                                                                                                                                                                                                    1612
                                                                                                                                                                                                                                                                                                                                1552
                                                                                                                                                                                                                                                                                                                                                                                            1492
                                                                                                                                                                                                                                                                                                                                                                                                                                                        1432
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1375
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1315
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1255
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1195
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1135
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1075
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1015
                                                                                                                                                                                                                                                                                                  148
                                                                                                                                                                                                                                                                                                                                                               208
                                                                                                                                                                                                                                                                                                                                                                                                                           268
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       328
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     388
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   448
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               508
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            568
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          625
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        682
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    742
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                802
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               895
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             862
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           835
                                                                                                                                                                        28
                                                                                                                                                                                                                                      88
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         503;
                                             CB643557 867 bp or OSJNEb04F02.r OSJNEb Oryza sativa (clone OSJNEb04F02 3', mkNA sequence CB643557
 oryza
                EST
                              CB643557.1
                                                                                                                                                                                            GAG 1674
                                                                                                                                                                                                                                    AAGCTCATGACCTCCACCTACATCGTCGCCCCTGTGCCAGGCCGTAGACCTTCGCCACCTC
                                                                                                                                                                                                                                                                                                                                GCCGTCAACTCGCTCTCATCTCCGCGCGCCGCACTGCCGAGGCCAACGACGTCCTT
                                                                                                                                                                          GAG
                                                                                                                                                                                                                                                                  TCTCTCCTTCTCGCCTCGCACCTGTACTGCACGCTCCAGGCCGTCGACCTCCGCGCGATG
                                                                                                                                                                                                                                                                                                GACGTGAACTCGCTGGGTCTCGTCTCGGCCAGGAAGACCCTGGAGGCGGTGGACATCCTC
                                                                                                                                                                                                                                                                                                                                                                                          cTCGGCCACCTTGCCAACCCGGTCACTACCTTCGTCCAGCCCGCAGAGATGGGCAACCAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          GTCGAGAACAAGCAGACCGCGCACGGCGCAACTTCCAGGCGTCGGCTGTCTCGATTTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GGCCGAAGGAGGTCTCGGTCTGGTCAACGGAACGGCCGTCTCGCCTCGATGGCGACC
                                                                                                                                                                                                                                                                                                                                                              CTCCAGTACCTCGCCAACCCCATCACCAACCATGTCCAGAGCGCGCGGAGCAGCACCAG
                                                                                                                                                                                                                                                                                                                                                                                                                           CCGAGCTTGGACTACGGGTTCAAGGGCACCGAGATCGCCATGGCCTCCTACTGCTCTGAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                         CCGTCGCTCAACTATCACGGCAAGGGCTTGGACATTCACATCGCTGCTTACGCTTCGGAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       GAGCTCGTGAACGAGTTCTACAACAACGGGCTGACCTCCAACCTGGCCGGCAGCCGCAAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GAGTTGCTCAACGCTGCCATGAACCGCGGCCTGCCTTCGTGCCTCGCTG----CCGAGGAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ATGGACAACGCCCGTCTCGCCATCGCCAACATCGGCAAGCTCATGTTCGCGCAGTTCTCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ATGGAGAAGACCAGGCTCGCACTCGCCCTCATCGGCAAGCTCAACTTCACGCAGTGCACC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 GTCCACCGCGGCAAGGCGCTCCACGGCGCAACTTCCAGGGCACCCCCATCGGTGTGTCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             GCCGCCACCAAGTCCATCGAGCGCCAAGGTCAACTCCGTGAACGACAACCCGGTGATCGAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CACGCCTACTCGACTCTCGCCTCGAGAACACCACGACGACGACCACCCGCTCCTCGAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           GACAGGTACGCGCACGTCGCCGCAGTGGCTCGGCCCGCAGATCGAGGTCATCCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       GACCGCTACCCGCTCCGCACGTCGCCTCAGTTCCTCGGCCCGCTCGTGGAGGACATGATG 1194
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            11---
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     TTTGCCGTTGAGCACGAGGAGGAGGTCAAGGTCAAGGACGACGAGGGCATTCTTCGCCAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  TGCGAGGTGATGAACGGCAAGCCGGAGTACACCGACCACCACGAGCTGAAGCTGAAGCAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                ACCGTGATGTTCGACGCCAACATCCTCGCCGTCCTGTCCGAGGTGCTCTCGGCGGTGTTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      --- CACCCTGGGTCGATCGAGGCCGCCGCCATCATGGAGCACATCCTCGCCGGGGAGCTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                GTGGAGGCCATGGTCGGCCAGCAGGGCTCGTTCGCGCCGTTCATCCACGACGTCTGCCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CTCAGTCTGCACGACTCGCACATGCTCTCGCTCTCTCGCAGGCCTTGACGGCTCTCACG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            GACCCCAAGGAAGGTCTCGCCATCGTCAATGGCACGTCCGTGGGGGTCGGCGCTCGCGGCCC
 sativa
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Conservative
                                                                                                                                                                          8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CATGAGCCACGCCAAGAAGGTGAACGAGATGGACCCGCTGCTGAAGCCGAAGCAG
                              GI:29638548
(japonica cultivar-group)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        59.7%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         0,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Pred. No. 1.3e-26;
0; Mismatches 331;
                                                                           (japonica cultivar-group) cDNA
                                                                                             mRNA
                                                                                           linear
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Indels
                                                                                             EST 08-APR-2003
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         9
                                                                                                                                                                                                                                                                                                                                1611
                                                                                                                                                                                                                                                                                                                                                                                            1551
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1431
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1374
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1134
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1014
                                                                                                                                                                                                                                    29
                                                                                                                                                                                                                                                                  1671
                                                                                                                                                                                                                                                                                                89
                                                                                                                                                                                                                                                                                                                                                              149
                                                                                                                                                                                                                                                                                                                                                                                                                                                         1491
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1314
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1254
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1074
                                                                                                                                                                                                                                                                                                                                                                                                                          209
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       269
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   329
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 389
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             449
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           509
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    626
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                683
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              954
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              743
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           894
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             803
```

φ

```
JOURNAL COMMENT
                                                                                                                                                                                                                                                     Ş
                                                                                                                                                                                                                                                                                           Ď,
                                                                                                                                                                                                                                                                                                                              8
                                                                                                                                                                                                                                                                                                                                                                     멇
                                                                                                                                                                                                                                                                                                                                                                                                        Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     ORIGIN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            FEATURES
                                                                                           Š
                                                                                                                                    밁
                                                                                                                                                                       Ş
                                                                                                                                                                                                                B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                REFERENCE
                  δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Best Loca
Matches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Query Match
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         TITLE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               AUTHORS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             ORGANISM
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            source
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Local
                                                                                                                                                                                                                                                       1072
                                                                                                                                                                                                                                                                                                                                  1012
                                                                                                                                                                                                                  628
                                                                                                                                                                                                                                                                                             685
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         504;
                                                                                                                                                                                                                                                                                                                                                                       745
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Jantasuriyarat, C., Lu,G., Gowda,M., Hatfield,J., Zhou,B., Mazur Kudrna,D., Dean,R., Soderlund,C., Wing,R. and Wang,G. Large-scale identification of ESTs involved in the interaction between rice and Magnaporthe grisea
Unpublished (2003)
Contact: Rod Wing
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Oryza sativa (japonica cultivar-group)
Eukaryota; Viridiplantae; Streptophyta; Embryophyta; Tracheophyta;
Spermatophyta; Magnoliophyta; Liliopsida; Poales; Poaceae;
Ehrhartoideae; Oryzeae; Oryza.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           85721-0088, USA
Tel: 520 626 3967
Fax: 520 621 9288
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Seq primer: gga aac agc tat gac
Location/Qualifiers
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             BACKWARD: gga aac agc tat gac cat
Plate: 04 row: F column: 02
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Email: http://genome.arizona.edu
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Arizona Genomics Institute University of Arizona
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      FORWARD: gta aaa cga cgg
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Similarity
GACGTCGAGAACAAGCAGACCGCGCACCGGCGAACTTCCAGGCGTCGGCTGTCTCGATT
                                                                                                                                                                             CAGGACCGCTACCCGCTCCGCACGTCGCCTCAGTTCCTCGGCCCGCTCGTGGAGGACATG 1191
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ACCCTCAGTCTGCACGACTCGCACATGCTCTCGCTCTCTCGCAGGCCTTGACGGCTCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CTCGGCCCGAAGGAGGGTCTCGGTCTGGTCAACGGAACGGCCGTCTCCGCCTCGATGGCG
                                                             CGCGCCGCCACCAAGTCCATCGAGCGCGAGGTCAACTCCGTGAACGACAACCCCGGTGATC
                                                                                             ATGCACGCCTACTCGACTCTCGCTCGAGAACAACACGACGACGACAACCCGCTCCTC
                                                                                                                                      CAGGACAGGTACGCGCTCCGCACGTCGCCGCAGTGGCTCGGCCCGCAGATCGAGGTCATC 512
                                                                                                                                                                                                                TOGIT----CATGAGCCACGCCAAGAAGGTGAACGAGATGGACCCGCTGCTGAAGCCGAAG 572
                                                                                                                                                                                                                                                       TCGTTTGCCGTTGAGCACGAGGAGGAGGTCAAGGTCAAGGACGACGAGGGCATTCTTCGC 1131
                                                                                                                                                                                                                                                                                           CAC---CACCCTGGGTCGATCGAGGCCGCCGCCATCATGGAGCACATCCTCGCCGGGAGC
                                                                                                                                                                                                                                                                                                                                CGCCCGCACCCCGGCCAGGTCGAGGTCGCGCGCAACATCCGCACGCTCCTTTCCGGCTCG 1071
                                                                                                                                                                                                                                                                                                                                                                         TTCTGCGAGGTGATGAACGGCAAGCCGGAGTACACCGACCACCTGACCCACAAGCTGAAG
                                                                                                                                                                                                                                                                                                                                                                                                            GCCACCGTGATGTTCGACGCCAACATCCTCGCCGTCCTGTCCGAGGTGCTCTCGGCGGTG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CTGAACCCCAAGGAAGGTCTCGCCATCGTCAATGGCACGTCCGTGGGGTCGGCGCTCGCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            chartoideae; Oryzeae; Oryza. (bases 1 to 867)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        PRimers
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        logical Sciences
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        /organism="Oryza sativa (
/mol type="mRNA"
/culTivar="Nipponbare"
/db_xref="taxon:39947"
/clone="OSJNEb04F02"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       /note="Vector: pBluescript II KS +; Site_1: Ecoi XhoI; 24 hrs after innoculation with Rice Blast 86061)"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 /tissue_type="Leaf"
/dev_stage="3 week"
/lab_host="DH10B"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        11.0%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    West,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Score 265.2; DB 1
Pred. No. 1.4e-26;
0; Mismatches 333
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        448A,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               cat
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        ю.
О.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      (japonica
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ω
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              DB 14;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             ú
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Box 210088,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      cultivar-group)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Length 867;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Tucson,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            EcoRI; Si
last (Che
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         9
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Mazur,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Site_2:
                                                                                                                                                                                                                                                                                                                                                                                                              1011
                                                                                                                                                                                                                                                                                                                                                                         686
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                806
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       891
                                                               452
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         951
```

```
REFERENCE
AUTHORS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   RESULT 10
CB651503/c
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 VERSION
KEYWORDS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                     FEATURES
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            COMMENT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      SOURCE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           DEFINITION
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             ACCESSION
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     LOCUS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   TITLE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                ORGANISM
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  JOURNAL
                                                                                                                                                                                                                                                                                                  source
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1609
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1549
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1489
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1429
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1312
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     331
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                151
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         211
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       271
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            451 GACGTCCACCGCGGCAAGGCGCTCCACGGCGGCAACTTCCAGGGCACCCCCATCGGTGTG 392
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        <u>ω</u>
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  91
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 CB651503.1
CB651503.1
EST.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Oryza sativa (japonica cultivar-group)
Oryza sativa (japonica cultivar-group)
Oryza sativa (japonica cultivar-group)
Eukaryota; Viridiplantae; Streptophyta; Embryophyta; Tracheophyta;
Spermatophyta; Magnoliophyta; Liliopsida; Poales; Poaceae;
Spermatophyta; Magnoliophyta; Liliopsida; Poales; Poaceae;
Enthartoideae; Oryzeae; Oryza.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Jantasuriyarat,C., Lu,G., Gowda,M., Hatfield,J., Zhou,B., Mazur,E., Kudrna,D., Dean,R., Soderlund,C., Wing,R. and Wang,G. Karge-scale identification of ESTs involved in the interaction between rice and Magnaporthe grisea Unpublished (2003)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            OSJNEb16H19.r OSJNEb Oryza sativa (japonica clone OSJNEb16H19 3', mRNA sequence.
                                                                                                                                                                                                                                                                                                                                 BACKWARD: 9ga aac agc tat gac cat g
Plate: 16 row: H column: 19
Seq primer: 9ga aac agc tat gac cat g.
Location/Qualifiers
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Contact: Rod Wing
Arizona Genomics Institute
                                                                                                                                                                                                                                                                                                                                                                                                                                                FORWARD: gta aaa cga cgg cca gtg
BACKWARD: gga aac agc tat gac cat
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Tel: 520 626 3967
Fax: 520 621 9288
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 University of Arizona
Biological Sciences West, 448A,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CB651503
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 PCR PRimers
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Email: http://genome.arizona.edu
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             ATGGAG 1674
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     TCCGÁGCTCGTGAACGAGTTCTACAACAACGGGCTGACCTCCAACCTGGCCGGCAGCCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         ACCGAGTTGCTCAACGCTGCCATGAACCGCGGCCTGCCTTCGTGCCTCGCTG----CCGAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CTCGAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CAGGACGTGAACTCGCTGGGTCTCGTCTCGGCCAGGAAGACCCTGGAGGCGGTGGACATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        GAGCTCCAGTACCTCGCCAACCCCATCACCAACCATGTCCAGAGCGCGGGGGGCAGCACAAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GAGCTCGGCCACCTTGCCAACCCGGTCACTACCTTCGTCCAGCCCGCAGAGATGGGCAAAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       AACCCGAGCTTGGACTACGGGTTCAAGGGCACCGAGATCGCCATGGCCTCCTACTGCTCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            GACCCGTCGCTCAACTATCACGGCAAGGGCTTGGACATTCACATCGCTGCTTACGCTTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              TCCATGGACAACGCCCGTCTCGCCATCGCCAACATCGGCAAGCTCATGTTCGCGCAGTTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               тсватвелавлавасствестсвенствестствення в температельного по температель
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CTCAAGCTCATGACCTCCACCTACATCGTCGCCCTGTGCCAGGCCGTCGACCGTCGCCAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CTTTCTCTCCTTCTCGCCTCGCACCTGTACTGCACGCTCCAGGCCGTCGACCTTCCGCGCG 1668
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  (bases 1 to 867)
/organism "Oryza sativa (
/mol type="mRNA"
/cultivar="Nipponbare"
/db_xref="taxon:39947"
/clone="OSUNEb16H19"
/tissue_type="Leaf"
/dev_stage="3 week"
/lab_host="DH10B"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  USA
                                                                                                                                                                                                                                                                                                          . 867
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     867 bp
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ₽.0.
                                                                                                                                                                                                                                                                    (japonica cultivar-group)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        TIRNA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Box 210088,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              linear EST 08-F
cultivar-group)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Tucson,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1608
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 152
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           212
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1428
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1371
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1548
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      332
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    92
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1488
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            272
```

```
Ş
                                                                                                         B
                                                                                                                                                        Ś
                                                                                                                                                                                                                g
G
                                                                                                                                                                                                                                                                        Ś
                                                                                                                                                                                                                                                                                                                                               В
                                                                                                                                                                                                                                                                                                                                                                                           Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                            В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Вb
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ъ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               δÃ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 D.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                멍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   뫄
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Query Match
Best Local S
Matches 504
                                                    1669
                                                                                                                                                                          1609
                                                                                                                                                                                                                                                                                       1549
                                                                                                                                                                                                                                                                                                                                                                                                          1489
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1429
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1372
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1192
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1132
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1312
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1252
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1072
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1012
                                                                                                                                                                                                                                  151
                                                                                                                                                                                                                                                                                                                                                  211
                                                                                                                                                                                                                                                                                                                                                                                                                                                                     271
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     331
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        391
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           451
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              511
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              571
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 628
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    685
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       745
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       805
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 832
31
                                                                                                                  91
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            504;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Similarity
                                                       ATGGAG 1674
   CTCGAG
                                                                                                                                                              CTTTCTCTCTCTCGCACCTCGCACCTGTACTGCACGCTCCAGGCCGTCGACCTCCGCGCG 1668
                                                                                                                                                                                                                               CAGGACGTGAACTCGCTGGGTCTCGGCCAGGAAGACCCTGGAGGCGGTGGACATC
                                                                                                                                                                                                                                                                                 CAGGCCGTCAACTCGCTCGCTCATCTCCGCGCGCGCACTGCCGAGGCCAACGACGTC
                                                                                                                                                                                                                                                                                                                                               GAGCTCCAGTACCTCGCCAACCCCATCACCAACCATGTCCAGAGCGCGCGGAGCAGCACAAC
                                                                                                                                                                                                                                                                                                                                                                                                       GAGOTOGGOCACOTTGOCAACOOGGTCACTACOTTCGTCCAGCCCGCAGAGATGGGGCAAC 1548
                                                                                                                                                                                                                                                                                                                                                                                                                                                                  AACCCGAGCTTGGACTACGGGTTCAAGGGCACCGAGATCGCCATGGCCTCCTACTGCTCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    GACCCGTCGCTCAACTATCACGGCAAGGGCTTGGACATTCACATCGCTGCTTACGCTTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          ACCGAGTTGCTCAACGCTGCCATGAACCGCGGCCTGCCTTCGTGCCTCGCTG----CCGAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        GACGTCCACCGCGCAAGGCGCTCCACGGCGCAACTTCCAGGGCACCCCCATCGGTGTG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ATGCACGCCTACTCGACTCTCCCCTCGAGAACAACACGACGACGACAACCCGCTCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CAGGACCGCTACCCCGCACGTCGGCCTCAGTTCCTCGGCCCGCTCGTGGAGGACATG 1191
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        ACGGTGGAGGCCATGGTCGGCCAGCAGGCCTCGTTCGCGCGTTCATCCACGACGTCTGC 1011
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   GCCACCGTGATGTTCGACGCCAACATCCTCGCCGTCCTGTCCGAGGTGCTCTCGGCGGTG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               ACCCTCAGTCTGCACGACTCGCACATGCTCTCGCCTCTCGCAGGCCTTGACGGCTCTC
                                                                                                               CTCAAGCTCATGACCTCCACCTACATCGTCGCCCTGTGCCAGGCCGACGACCTTCGCCAC 32
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     TCCGAGCTCGTGAACGAGTTCTACAACAACGGGCTGACCTCCAACCTGGCCGGCAGCCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     TCCATGGACAACGCCCGTCTCGCCATCGCCAACATCGGCAAGCTCATGTTCGCGCAGTTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          TCGATGGAGAAGACCAGGCTCGCACTCGCCCTCATCGGCAAGCTCAACTTCACGCAGTGC 1371
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   GACGTCGAGAACAAGCAGACCGCGCACGGCGGCAACTTCCAGGCGTCGGCTGTCTCGATT 1311
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CGCGCCGCCACCAAGTCCATCGAGCGCGAGGTCAACTCCGTGAACGACAACCCGGTGATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CAGGACAGGTACGCGCCACGTCGCCGCAGTTGGCTCGGCCGCAGATCGAGGTCATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 TCGTT----CATGAGCCACGCCAAGAAGGTGAACGAGATGGACCCGCTGCTGAAGCCGAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 CAC---CACCCTGGGTCGATCGAGGCCGCCGCCATCATGGAGCACATCCTCGCCGGGAGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         ceccecacococaeccaes reasons de la cocace de la cocaceca del la cocaceca de la coca
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                TTCTGCGAGGTGATGAACGGCAAGCCGGAGTACACCGACCACCTGACCCACAAGCTGAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   CTGAACCCCAAGGAAGGTCTCGCCATCGTCAATGGCACGTCCGTGGGGGTCGGCGCTCGCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              crceecccanaeeaecercrceercreercnaceeaaceeccercrceccrceareece
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Conservative
26
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        /clone_lib="OSJNEb"
/note="Vector: pBluescript II KS +; Site_1: EcoRI; Site_2:
XhoI; 24 hrs after innoculation with Rice Blast (Che
86061)"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               11.0%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Score 265.2; DB 14;
Pred. No. 1.4e-26;
0; Mismatches 333;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      9
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Gaps
                                                                                                                                                                                                                                                                                       1608
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1488
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  272
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1428
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     332
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1251
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              572
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 629
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1071
                                                                                                                                                                                                                               92
                                                                                                                                                                                                                                                                                                                                                  152
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1131
                                                                                                                                                                                                                                                                                                                                                                                                                                                               212
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        392
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           452
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              512
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                686
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                746
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      806
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           951
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              891
```

RESULT 11 CB658123/c

```
맑
                             Ş
                                                                   B
                                                                                                  Ş
                                                                                                                                          밁
                                                                                                                                                                          Ş
                                                                                                                                                                                                                 В
                                                                                                                                                                                                                                                     Ś
                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                          Ś
                                                                                                                                                                                                                                                                                                                                                                      망
                                                                                                                                                                                                                                                                                                                                                                                                        S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              JOURNAL
COMMENT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       REFERENCE
AUTHORS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       VERSION
KEYWORDS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        ORIGIN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    FEATURES
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          SOURCE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               ACCESSION
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 LOCUS
DEFINITION
                                                                                                                                                                                                                                                                                                                                                                                                                                             Best Loca
Matches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Query Match
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     TITLE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    ORGANISM
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  source
                                                                                                                                                                                                                                                                                                                                                                                                                                                             Local
                                                                                                        1077
                                                                                                                                                                                1017
566
                                                                     623
                                                                                                                                              682
                                                                                                                                                                                                                     740
                                                                                                                                                                                                                                                       957
                                                                                                                                                                                                                                                                                             900
                                                                                                                                                                                                                                                                                                                                897
                                                                                                                                                                                                                                                                                                                                                                      860
                                                                                                                                                                                                                                                                                                                                                                                                                                             502;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CB658123 GI:29661848
EST.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Tel: 520 626 3967
Fax: 520 621 9288
Email: http://genome.arizona.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1 (bases 1 to 860)

Jantasuriyarat, C., Lu,G., Gowda, M., Hatfield, J., Zhou, B., Mazur, Kudrna, D., Dean, R., Soderlund, C., Wing, R. and Wang, G. Large-scale identification of ESTs involved in the interaction between rice and Magnaporthe grisea

Unpublished (2003)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Oryza sativa (japonica cultivar-group) oryza sativa (japonica cultivar-group) oryza sativa (japonica cultivar-group) Eukaryota, Viridiplantae, Streptophyta, Embryophyta; Tracheophyta; Spermatophyta; Magnoliophyta; biliopsida; Poales; Poaceae; Ehrhartoideae; Oryzeae; Oryza.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               CE655123 860 pp mkWM tilleat Wor OSJNEC13022.r OSJNEC Oryza sativa (japonica cultivar-group) clone OSJNEc13022 3', mRNA sequence.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                BACKWARD: gga aac agc tat gac cat g
Plate: 13 row: O column: 22
Seq primer: gga aac agc tat gac cat
Location/Qualifiers
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    University of Arizona
Biological Sciences West,
85721-0088, USA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Contact: Rod Wing
Arizona Genomics
                                                                                                                                                                                                                                                                                                                                                                                                                                                               Similarity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         FORWARD: gta aaa cga cgg cca gtg
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 PCR PRimers
                             ccectaccectccecacetcectcaetrcctceeccececteeteeaeeacateateca 1196
                                                                     ---CATGAGCCÁCGCCAÁGAAGGTGAACGAGATGGÁCCCGCTGCTGAAGCCGAAGCAGGA
                                                                                                        TGCCGTTGAGCACGAGGAGGACGTCAAGGTCAAGGACGACGACGACGCATTCTTCGCCAGGA 1136
                                                                                                                                                                                GGAGGCCATGGTCGGCCAGCAGGGCTCGTTCGCGCCGTTCATCCACGACGTCTGCCGCCC 1016
                                                                                                                                                                                                                                                                                                                                CAGTCTGCACGACTCGCACATGCTCTCGCTCTCTCGCAGGCCTTGACGGCTCTCACGGT
                                                                                                                                                                                                                                                                                                                                                                      CCCCAAGGAAGGTCTCGCCATCGTCAATGGCACGTCCGTGGGGGTCGGCGCTCGCGGCCAC
                                                                                                                                                                                                                                                                                                                                                                                                  CCCGAAGGAGGGTCTCGGTCTAACGGAACGGCCGTCTCCGCCTCGATGGCGACCCT
CAGGTACGCGCTCCGCACGTCGCCGCAGTGGCTCGGCCCGCAGATCGAGGTCATCCGCGC
                                                                                                                                                                                                                     CGAGGTGATGAACGGCAAGCCGGAGTACACCGGACCACCTGACCCACAAGCTGAAGCAC--
                                                                                                                                                                                                                                                                                             CGTGATGTTCGACGCCAACATCCTCGCCGTCCTGTCCGAGGTGCTCTCGGCGGTGTTCTG
                                                                                                                                              -CACCCTGGGTCGATCGAGGCCGCCGCCATCATGGAGCACATCCTCGCCGGGAGCTCGTT
                                                                                                                                                                                                                                                                                                                                                                                                                                             Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          /mol type="mRNA"
/cultivar="wipponbare"
/db xref="taxon:39947"
/clone="OSJNEC13022"
/tissue_type="Leaf"
/dev stage="3 week"
/lab_host="DHIOB"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Rod Wing
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      /clone lib="OSJNEC"
/note="Vector: pBluescript II KS +; Site_1: EcoRI; Site_2:
/note="Vector: pBluescript II KS +; Site_1: EcoRI; Site_2:
XhoI; 6 hrs after innoculation with Rice Blast (C9240-1)"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            organism="Oryza sativa
                                                                                                                                                                                                                                                                                                                                                                                                                                                           11.0%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Institute
                                                                                                                                                                                                                                                                                                                                                                                                                                           Score 265; DB 14;
Pred. No. 1.5e-26;
0; Mismatches 330;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        448A,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 . edu
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        P.O. Box
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              (japonica cultivar-group)"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    ω
                                                                                                                                                                                                                                                                                                                                                                                                                                             330;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        210088,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Length
                                                                                                                                                                                                                                                                                                                                                                                                                                             Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   860;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Tucson,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   EST 09-APR-2003
                                                                                                                                                                                                                                                                                                                                                                                                                                             φ
                                                                                                                                                                                                                                                                                                                                                                                                                                             Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        ΑZ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   CDNA
                                                                                                                                                                                1076
                                                                                                                                              624
                                                                                                                                                                                                                     683
                                                                                                                                                                                                                                                                                             741
                                                                                                                                                                                                                                                                                                                                                                      801
                                                                                                                                                                                                                                                                                                                                                                                                           896
507
                                                                       567
                                                                                                                                                                                                                                                                                                                                  956
```

```
ACCESSION
VERSION
KEYWORDS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  RESULT 12
CB651685/c
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  REFERENCE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               뫄
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 SOURCE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            δ
                                                                                    FEATURES
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  DEFINITION
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              rocus
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    TITLE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         AUTHORS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        ORGANISM
                                                                                                                                                                                                                                                                                                                                                                                                                                                              JOURNAL
                                                           source
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1494
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1434
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1377
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1317
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1674
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1614
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1554
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          146
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          386
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               206
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     86
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               26
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       OSJNEb16L23.r OSJNEb Oryza sativa (japonica clone OSJNEb16L23 3', mRNA sequence.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Oryza sativa (japonica cultivar-group)
Oryza sativa (japonica cultivar-group)
Oryza sativa (japonica cultivar-group)
Eukaryota, Viridiplantae, Streptophyta, Embryophyta; Tracheophyta;
Spermatophyta; Magnoliophyta; Liliopsida; Poales; Poaceae;
                                                                                                                           PCR PRimers
FORWARD: gta aaa cga cgg cca gtg
SACKWARD: gga aac agc tat gac cat
Plate: 16 row: L column: 23
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Jantasuriyarat, C., Lu, G., Gowda, M., Hatfield, J., Zhou, B., Mazur, Kudrna, D., Dean, R., Soderlund, C., Wing, R. and Wang, G. Large-scale identification of ESTs involved in the interaction
                                                                                                             Seq
                                                                                                                                                                                                                                         Tel: 520 626 3967
Fax: 520 621 9288
Smail: http://genome.arizona.edu
                                                                                                                                                                                                                                                                                                                          85721-0088, USA
                                                                                                                                                                                                                                                                                                                                                 University of Arizona
Biological Sciences West,
                                                                                                                                                                                                                                                                                                                                                                                                      Contact: Rod Wing
Arizona Genomics Institute
                                                                                                                                                                                                                                                                                                                                                                                                                                                           Unpublished (2003)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        between rice and Magnaporthe grisea
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ehrhartoideae;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      CB651685.1
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               ດ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  rerectrerecerecaecareractecaecarecaecerecaecerecaecerecaeceareca 1673
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               G 1674
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GCTCATGACCTCCACCTACATCGTCGCCCTGTGCCAGGCCGTCGAGCTTCGCCACCTCGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CGTGAACTCGCTGGGTCTCGTCTCGGCCAGGAAGACCCCTGGAGGCGGTGGACATCCTCAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CGTCAACTCGCTCGCTCTCATCTCCGCGCGCGCCACTGCCGAGGCCAACGACGTCCTTTC 1613
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               CGGCCACCTTGCCAACCCGGTCACTACCTTCGTCCAGCCCGCAGAGATGGGCCAACCAGGC 1553
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          GAGCTTGGACTACGGGTTCAAGGGCACCGAGATCGCCATGGCCTCCTACTGCTCTGAGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GTCGCTCAACTATCACGGCAAGGGCTTGGACATTCACATCGCTGCTTACGCTTCGGAGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               GCTCGTGAACGAGTTCTACAACAACGGGCTGACCTCCAACCTGGCCGGCAGCCGCAACCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 GTTGCTCAACGCTGCCATGAACCGCGGCCTGCCTTCGTGCCTCGCTG---CCGAGGACCC 143:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       GGACAACGCCCGTCTCGCCATCGCCAACATCGGCAAGCTCATGTTCGCGCAGTTCTCCGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GGAGAAGACCAGGCTCGCACTCGCCCTCATCGGCAAGCTCAACTTCACGCAGTGCACCGA 1376
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               CCACCGCGCAÁGGCGCTCCÁCGGCGCAÁCTTCCÁGGGCACCCCCATCGGTGTGTCCÁT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 CGAGAACAAGCAGACCGCGCACGGCGAACTTCCAGGCGTCGGCTGTCTCGATTTCGAT 1316
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CGCCACCAAGTCCATCGAGCGCGAGGTCAACTCCGTGAACGACAACCCGGTGATCGACGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CGCCTACTCGACTCTCGCTCGAGAACAACACGACGACGACAACCCGGCTCCTCGACGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             (bases 1 to 891)
                                                                                 primer: gga aac agc tat gac cat
Location/Qualifiers
/organism="Oryza sativa (japonica cultivar-group)"
/mol_type="mRNA"
                                                           1. .891
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      GI:29646678
                                                                                                                                                                                                                                                                                                                                                      448A,
                                                                                                                                                                                                                                                                                                                                                    P.O.
                                                                                                                                                                Ω
                                                                                                          ú
                                                                                                                                                                                                                                                                                                                                                         Box
                                                                                                                                                                                                                                                                                                                                                      210088,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         linear
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  cultivar-group)
                                                                                                                                                                                                                                                                                                                                                      Tucson,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           EST 08-APR-2003
                                                                                                                                                                                                                                                                                                                                                         ΑZ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1493
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       327
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1256
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     27
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          87
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          207
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               267
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               387
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       447
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       8
     Ś
                                                           맑
                                                                                                  8
                                                                                                                                                                  밁
                                                                                                                                                                                                               Š
                                                                                                                                                                                                                                                                        B
                                                                                                                                                                                                                                                                                                               Š
                                                                                                                                                                                                                                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                                                                                                                                                             Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             δõ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          ORIGIN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Matches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Query Match
Best Local :
           1664
                                                                                                                                                                                                                                                                                                                             1484
                                                                                                                                                                                                                                                                                                                                                                                                                                     1424
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1367
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1307
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1247
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1187
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1127
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1067
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1007
                                                                                                                                                                                                                        1544
                                                                                                                1604
                                                                                                                                                                     156
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        336
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  396
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        456
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     576
                                                                                                                                                                                                                                                                             216
                                                                                                                                                                                                                                                                                                                                                                                  276
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               516
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             633
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     690
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  810
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          750
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               947
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          870
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            505;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Similarity
                                                                                                                                                                                                                                                                                                                             CTTCGGAGCTCGGCCACCTTGCCAACCCGGTCACTACCTTCGTCCAGCCCGCAGAGATGG 1543
                                                                                                                                                                                                                     geaaceaegecercaacreerregerenterereregecececacacreeceaegeceaace
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                GTGTGTCCÁTGGÁCAÁCGCCCGTCTCGCCATCGCCAACATCGGCAAGCTCATGTTCGCGC 337
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CGATTTCGATGGAGAAGACCAGGCTCGCACTCGCCCTCATCGGCAAGCTCAACTTCACGC 1366
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CGAAGCAGGACAGGTACGCGCTCCGCACGTCGCCGCAGTGGCCTCGCCCGCAGATCGAGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       TCCTCGACGTCGAGAACAAGCAGACCGCGCACGGCGGCAACTTCCAGGCGTCGGCTGTCT 1306
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  TCATCCGCGCCGCCACCAAGTCCATCGAGCGCGAGGTCAACTCCGTGAACGACAACCCGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  ACATGATGCACGCCTACTCGACTCTCTCGCTCGAGAACAACACGACGACGACGACAACCCGC 1246
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    TICGCCAGGACCGCTACCCGCTCCGCACGTCGCCTCAGTTCCTCGGCCCGCTCGTGGAGG 1186
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               GCTCGTCGTTTGCCGTTGAGCACGAGGAGGAGGAGGTCAAGGTCAAGGACGACGAGGGCATTC
                                                                                                                                                                     ACAACCAGGACGTGAACTCGCTGGGTCTCGTCTCGGCCAGGAAGACCCCTGGAGGCGGTGG
                                                                                                                                                                                                                                                                                                                                                                                  GCCGCAACCCGAGCTTGGACTACGGGTTCAAGGGCACCGAGATCGCCATGGCCTCCTACT
                                                                                                                                                                                                                                                                                                                                                                                                                                     CCGAGGACCCGTCGCTCAACTATCACGGCAAGGGCTTGGACATTCACATCGCTGCTTACG 1483
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          AGTTCTCCGAGCTCGTGAACGAGTTCTACAACAACGGGCTGACCTCCAACCTGGCCGGCA 277
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               GGAGCTCGTT---
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       TCTGCCGCCCGCACCCCGGCCAGGTCGAGGTCGCGCAACATCCGCACGCTCCTTTCCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CGGTGTTCTGCGAGGTGATGAACGGCAAGCCGGAGTACACCGACCACCTGACCCACAAGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               CTCTCACGGTGGAGGCCATGGTCGGCCAGCAGGGCTCGTTCGCGCCGTTCATCCACGACG 1006
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  TCGCGGCCACCGTGATGTTCGACGCCAACATCCTCGCCGTCCTGTCCGAGGTGCTCTCGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    rescencercas respectation respectation of the 
                                                                ACATCCTCAAGCTCATGACCTCCACCTACATCGTCGCCCTGTGCCAGGCCGACGACCTTC
                                                                                                             ACGTCCTTTCTCTCCTTCTCGCCTCGCACCTGTACTGCACGCTCCAGGCCGTCGACCTCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          AGIGCACCGAGITGCTCAACGCIGCCAIGAACCGCGGCCTGCCTTCGIGCCTCGCIG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          TGATCGACGTCCACCGCGCAAGGCGCTCCACGGCGAACTTCCAGGGCACCCCCATCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  TGAAGCAC---CACCCTGGGTCGATCGAGGCCGCCGCCATCATGGAGCACATCCTCGCCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          TCACGCTGAACCCCAAGAAAGGTCTCGCCATCGTCAATGGCACGTCCGTGGGGTCGGCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                /tissue_type="Leaf"
/dev_stage="3 week"
/lab_host="DH1DE"
/clone_lib="OSJNEb"
/clone_lib="OSJNEb"
/note="Vector: pBluescript II KS +; Site_1: EccRI; Site_2:
XhoI, 24 hrs after innoculation with Rice_Blast (Che_86061)"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 /db_xref="taxon:39947"
/clone="OSJNEb16L23"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       /cultivar="Nipponbare"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        10.9%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               - CATGAGCCACGCCAAGAAGGTGAACGAGATGGACCCCGCTGCTGAAGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               0
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Score 263.8; DB:
Pred. No. 2.2e-26
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Mismatches 337;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 DB 14;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       891;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               9
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Gaps
```

1126

1066 691

634

751

946

811 886

w

517

457

1603

157

217

97

37

1423

```
RESULT 13
CB648470/c
LOCUS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         JOURNAL COMMENT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      ACCESSION
VERSION
KEYWORDS
Ş
                                 밁
                                                             Ś
                                                                                                     멼
                                                                                                                             8
                                                                                                                                                                   B
                                                                                                                                                                                                 Ş
                                                                                                                                                                                                                                          Ъ
                                                                                                                                                                                                                                                                          5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    SOURCE
ORGANISM
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            FEATURES
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Дb
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  REFERENCE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             DEFINITION
                                                                                                                                                                                                                                                                                                                     Query Match
Best Local Sim
Matches 505;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            TITLE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              AUTHORS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         source
 1067
                                                                     1007
                                                                                                         750
                                                                                                                                        947
                                                                                                                                                                            810
                                                                                                                                                                                                                887
                                                                                                                                                                                                                                                 870
                                                                                                                                                                                                                                                                                   827
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    36
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         BACKWARD: 90a and c9a c9g cca 9t9
Plate: 11 row: N column: 20
Seq primer: 99a and ago tat gac cat
Location/Qualifiers
1 803
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Jantasuriyarat, C., Lu, G., Gowda, M., Hatfield, J., Zhou, B., Mazus Kudrna, D., Dean, R., Soderlund, C., Wing, R. and Wang, G.
Large-scale identification of ESTs involved in the interaction between rice and Magnaporthe grisea
Unpublished (2003)
Contact: Rod Wing
Arizona Genomics Institute
University of Arizona
Biological Sciences West, 448A, P.O. Box 210088, Tucson, AZ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Oryza sativa (japonica cultivar-group) oryza sativa (japonica cultivar-group) oryza sativa (japonica cultivar-group) Eukaryota, Viridiplantae, Streptophyta, Embryophyta; Tracheophyta; Spermatophyta; Magnoliophyta; Liliopsida; Poales; Poaceae; Spermattoideae; Oryzeae; Oryza.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   CB648470 893 bp mRNA 1
OSJNEb11N20.r OSJNEb Oryza sativa (japonica
Clone OSJNEb11N20 3', mRNA sequence.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Tel: 520 626 3967
Fax: 520 621 9288
Email: http://genome.arizona.edu
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CB648470.1 GI:29643463
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CB648470
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      85721-0088,
                                                                                                                                                                                                                                                                                                                                    Similarity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               PCR PRimers
 GCTCGTCGTTTGCCGTTGAGCACGAGGAGGAGGTCAAGGTCAAGGACGACGACGAGGCATTC
                                                                                                                                       crcrcaceerecadeccareerceccaecaecaecrcerreecececrerrearceaecaece
                                                                                                                                                                              TCGCGGCCACCGTGATGTTCGACGCCAACATCCTCGCCGTCCTGTCCGAGGTGCTCTCGG
                                                                                                                                                                                                            TGGCGACCCTCAGTCTGCACGACTCGCACATGCTCTCGCTCTCGCAGGCCTTGACGG
                                                                                                                                                                                                                                                 TCACGCTGAACCCCAAGGAAGGTCTCGCCATCGTCAATGGCACGTCCGGGGGGGTCGGCGC
                                                                                                                                                                                                                                                                            TCGTCCTCGGCCCGAAGGAGGGTCTCGGTCTGGTCAACGGAACGGCCGTCTCCGCCTCGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    GCCACCTCGAG
                                                                     TCTGCCGCCCGCACCCCGGCCAGGTCGAGGTCGCGCGCAACATCCGCACGCTCCTTTCCG
                                                                                                         CGGTGTTCTGCGAGGTGATGAACGGCAAGCCGGAGTACACCGACCACCTGACCCACAAGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 (bases 1 to 893)
                                                                                                                                                                                                                                                                                                                     Conservative
                                                                                                                                                                                                                                                                                                                                                                                                       /tissue_type="Leaf"
/dev_stage="3 week"
/lab hoste "DHIDB"
/clone_lib="OSJNEb"
/clone_ib="OSJNEb"
/note="Vector: pBluescript II KS +; Sit XbOI; 24 hrs after innoculation with Ri 86061)"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               /organism="Oryza sativa (
/mol type="mRNA"
/cultivar="Nipponbare"
/db xref="taxon:39947"
/clone="OSJNEb11N20"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      USA
                                     - CACCCTGGGTCGATCGAGGCCGCCGCCATCATGGAGCACATCCTCGCCG
                                                                                                                                                                                                                                                                                                                                    10.9%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    26
                                                                                                                                                                                                                                                                                                                     ç
                                                                                                                                                                                                                                                                                                                   Score 263.8; DB 14
Pred. No. 2.2e-26;
0; Mismatches 337;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       (japonica
                                                                                                                                                                                                                                                                                                                                                       DB 14;
                                                                                                                                                                                                                                                                                                                   Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       cultivar-group)"
                                                                                                                                                                                                                                                                                                                                                       Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              linear
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           cultivar-group)
                                                                                                                                                                                                                                                                                                                                                                                                                            Site_1: Ecol
h Rice Blast
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              EST 08-APR-2003
                                                                                                                                                                                                                                                                                                                     ,
                                                                                                                                                                                                                                                                                                                                                                                                                                               EcoRI;
                                                                                                                                                                                                                                                                                                                   Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                (Che
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Mazur,
                                                                                                                                                                                                                                                                                                                                                                                                                                         Site_2:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CDNA
 1126
                                                                     1066
                                                                                                                                        1006
                                                                                                                                                                                                                                                                                   886
                                                                                                                                                                                                              946
                                                                                                                                                                                                                                                 811
                                   634
                                                                                                         691
                                                                                                                                                                            751
                                                                                                                                                           JOURNAL
COMMENT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                             RESULT 14
CB673619/c
                                                                                                                                                                                                                                                                                                                                                                         VERSION
KEYWORDS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              δÃ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ş
                                                                                                                                                                                                                                                                  REFERENCE
                                                                                                                                                                                                                                                                                                                                                         SOURCE
                                                                                                                                                                                                                                                                                                                                                                                                                                               DEFINITION
                                                                                                                                                                                                                                                                                                                                                                                                                                                              FOCUS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      맑
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           뭐
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               문
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                                                                                                                                           ACCESSION
                                                                                                                                                                                                              TITLE
                                                                                                                                                                                                                                                                                                                                      ORGANISM
                                                                                                                                                                                                                                                 AUTHORS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1664
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1604
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1484
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1424
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1367
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1307
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1247
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1187
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1127
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1544
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               156
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  216
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           336
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               396
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    456
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         516
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             576
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  633
85721-0088, USA
Tel: 520 626 3967
Fax: 520 621 9288
Email: http://genome.a
PCR Primers
FORWARD: gta aaa cga c
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         96
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      36
                                                                                                                                                       between rice and Magnaporthe grisea
Unpublished (2003)
Contact: Rod Wing
                                                                                                                                                                                                                                                                               Oryza sativa (japonica cultivar-group) Oryza sativa (japonica cultivar-group) Eukaryota; Viridiplantae; Streptophyta; Em Spermatophyta; Magnoliophyta; Liliopsida; Ehrhartoideae; Oryzeae; Oryza.
                                                                                                                                                                                                                                                                                                                                                                                          CB673619
CB673619.1
                                                                                                                                                                                                                                                                                                                                                                                                                        CB673619 868 bp mRNA
OSJNEe08D18.r OSJNEe Oryza sativa (japonica
clone OSJNEe08D18 3', mRNA sequence.
                                                                                                     Arizona Genomics Institute
University of Arizona
Biological Sciences West,
                                                                                                                                                                                                          Jantasuriyarat,C., Lu,G., Gowda,M., Hatfield,J., Zh
Kudrna,D., Dean,R., Soderlund,C., Wing,R. and Wang,
Large-scale identification of ESTs involved in the
                                                                                                                                                                                                                                                                                                                                                                         EST
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      GCGCGATGGAG 1674
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         ACGTCCTTTCTCCTCTCGCCTCGCACCTGTACTGCACGCTCCAGGCCGTCGACCTCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               ACAACCAGGACGTGAACTCGCTGGGTCTCGTCTCGGCCAGGAAGACCCCTGGAGGCGGTGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   GCAACCAGGCCGTCAACTCTCATCTCCGCGCGCGCACTGCCGAGGCCAACG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                GCTCTGAGCTCCAGTACCTCGCCAACCCCATCACCATGTCCAGAGCGCGCGGAGCAGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  cTTCGGAGCTCGGCCACCTTGCCAACCCGGTCACTACCTTCGTCCAGCCCGCAGAGATGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CCGAGGACCCGTCGCTCAACTATCACGGCAAGGGCTTGGACATTCACATCGCTGCTTACG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GTGTGTCCATGGACAACGCCCGTCTCGCCATCGCCAACATCGGCAAGCTCATGTTCGCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             CGATTTCGATGGAGAAGACCAGGCTCGCACTCGCCCTCATCGGCAAGCTCAACTTCACGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      TCCTCGACGTCGAGAACAAGCAGACCGCGCGCACGGCGAACTTCCAGGCGTCGGCTGTCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         TCATCCGCGCCGCCAACTAACTCGAGCGCGAGGTCAACTCCGTGAACGACAACCCGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           ACATGATGCACGCCTACTCGACTCTCTCGCTCGAGAACAACACGACGACGACCAACCCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     TTCGCCAGGACCGCTACCCCGCTCGCACGTCGCCTCAGTTCCTCGGCCCCGCTCGTGGAGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                GGAGCTCGTT---CATGAGCCACGCCAAGAAGGTGAACGAGATGGACCCGCTGCTGAAGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         ACATCCTCAAGCTCATGACCTCCACCTACATCGTCGCCCTGTGCCAGGCCGTAGACCTTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      GCCGCAACCCGAGCTTGGACTACGGGTTCAAGGGCACCGAGATCGCCATGGCCTCCTACT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           AGTTCTCCGAGCTCGTGAACGAGTTCTACAACAACGGGCTGACCTCCAACCTGGCCGGCA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               TGATCGACGTCCACCGCGGCAAGGCGCTCCACGGCGGCAACTTCCAGGGCACCCCCATCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             CGAAGCÁGGACAGGTACGCGCTCCGCÁCGTCGCCGCAGTGGCTCGGCCCGCAGATCGAGG
                                                                                                                                                                                                                                                                chartoideae; Oryzeae; Oryza. (bases 1 to 868)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      26
 cgg
 cca gtg
                                                                                                         448A,
                                                                                                         P.O.
                                                                                                         Box
                                                                                                                                                                                                                                                                                                    Embryophyta; Trach
a; Poales; Poaceae;
                                                                                                         210088,
                                                                                                                                                                                                                                                                                                                                                                                                                                             linear E
a cultivar-
                                                                                                          Tucson,
                                                                                                                                                                                                                                              Zhou, B.,
```

EST 09-APR-2003

1543

157

1603

97

1663

37

1483

277

217

1366

397

337

1423

1306

1246

457

577

1186

517

-group)

Tracheophyta;

Į.

ΑZ

```
밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              멍
                                                                                                                                                                                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              멁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
멍
                                                          Ş
                                                                                                                                         밁
                                                                                                                                                                                                        80
                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                             S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 멂
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             ORIGIN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                FEATURES
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Query Match
Best Local Sim
Matches 503;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         source
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1312
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1012
                                                                                                                                                                                                                                                                                                                                                                     1429
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1252
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1072
                                                                                                                                                                                                                                                                                              271
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 391
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              451
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               511
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       685
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     805
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             832
151
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               BACKWARD: gga aac agc tat gac cat
Plate: 08 row: D column: 18
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Similarity
                                                                  caseccercaacrocercroarcrosecececacroceaageccaaceacerc
                                                                                                                                                                                                                GAGCTCGGCCACCTTGCCAACCCGGTCACTACCTTCGTCCAGCCCGCAGAGATGGGCAAC
                                                                                                                                                                                                                                                                                              AACCCGAGCTTGGACTACGGGTTCAAGGGCACCGAGATCGCCATGGCCTCCTACTGCTCT
                                                                                                                                                                                                                                                                                                                                                                 GACCCGTCGCTCAACTATCACGGCAAGGGCTTGGACATTCACATCGCTGCTTACGCTTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                               TCCGAGCTCGTGAACGAGTTCTACAACAACGGGCTGACCTCCAACCTGGCCGGCAGCCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  ACCGAGTTGCTCAACGCTGCCATGAACCGCGGCCTGCCTTCGTGCCTCGCTG----CCGAG 1428
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   TCGATGGAGAGACCAGGCTCGCACTCGCCCTCATCGGCAAGCTCAACTTCACGCAGTGC 1371
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    GACGTCGAGAACAAGCAGACCGCGCACGGCGAACTTCCAGGCGTCGGCTGTCTCGATT 1311
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   CGCGCCGCCACCAAGTCCATCGAGCGCGAGGTCAACTCCGTGAACGACAACCCCGGTGATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              ATGCACGCCTACTCGACTCTCGCTCGAGAACAACACGACGACGACAACCCGCTCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                TCGTTTGCCGTTGAGCACGAGGAGGAGGACGAGGTCAAGGACGACGACGACGATTCTTCGC 1131
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   CAC---CACCCTGGGTCGATCGAGGCCGCCGCCATCATGGAGCACATCCTCGCCGGGAGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CGCCCGCACCCCGGCCAGGTCGAGGTCGCGCGCAACATCCGCACGCTCCTTTCCGGCTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    TTCTGCGAGGTGATGAACGGCAAGCCGGAGTACACCGACCACCTGACCCACAAGCTGAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           ACGGTGGAGGCCATGGTCGGCCAGCAGGGCTCGTTCGCGCCGTTCATCCACGACGTCTGC 1011
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GCCACCGTGATGTTTGACGCCAACATCCTCGCCGTCCTGTCCGAGGTGCTCTCGGCGGTG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    accercaererecaceaerececaeaerecrerecererecaeaeeeerreaeeeerecre
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      CTGAACCCCAAGGAAGGTCTCGCCATCGTCAATGGCACGTCCGTGGGGTCGGCGCTCGCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         cressecces, and a contract the contract of the
                                                                                                                                             GAGCTCCAGTACCTCGCCAACCCATCACCAACCATGTCCAGAGCGCGGAGCAGCACAAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             TCCATGGACAACGCCCGTCTCGCCATCGCCAACATCGGCAAGCTCATGTTCGCGCAGTTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           primer:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    /clone_lib="OSJNEe"
/note="Vector: pBluescript II KS +; Site_1: EcoRI; Site_2:
/not; 24 hrs after innoculation with Rice Blast (70-15)"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  /tissue_type="Leaf"
/dev_stage="3 week"
/lab_host="DH10B"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       /organism="Oryza sativa
/mol_type="mRNA"
/cultivar="Nipponbare"
/db_xref="taxon:39947"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    r: gga aac agc tat gac
location/Qualifiers
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CATGAGCCACGCCAAGAAGGTGAACGAGATGGACCCGCTGCTGAAGCCGAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                clone="OSJNEe08D18"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         . 868
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       10.9%;
CTGGGTCTCGTCTCGGCCAGGAAGACCCTGGAGGCGGTGGACATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Score 263.6; DB 14; Length Pred. No. 2.4e-26; O; Mismatches 334; Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               cat
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 (japonica cultivar-group)"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  9
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           φ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    9
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 746
                                                                                                                                                                                                                       1548
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   452
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                512
                                                                                                                                                                                                                                                                                              212
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  572
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            951
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      806
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             891
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    ω
```

```
RESULT 15
CB647704/c
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               VERSION
KEYWORDS
                                                                                                            Ş
                                                                                                                                                      B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 g
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        8
                             Š
                                                                           B
                                                                                                                                                                                       Ş
                                                                                                                                                                                                                                                                                                                 ORIGIN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            REFERENCE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            SOURCE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ACCESSION
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              DEFINITION
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              FEATURES
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           COMMENT
                                                                                                                                                                                                                                   Query Match
Best Local Similarity
Matches 500; Conserv
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    TITLE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         AUTHORS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         ORGANISM
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            JOURNAL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           source
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1609
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1669 ATGGAG 1674
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Arizona Genomics Institute
University of Arizona
Biological Sciences West, 448A, P.0
85721-008B, USA
Tel: 520 626 3967
Fax: 520 621 528
Email: http://genome.arizona.edu
                                                                                                                                                                                              839
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               91
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 3
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Oryza sativa (japonica cultivar-group)
Oryza sativa (japonica cultivar-group)
Oryza sativa (japonica cultivar-group)
Eukaryota, Viridiplantae, Streptophyta, Embryophyta; Tracheophyta;
Spermatophyta; Nagnoliophyta; Liliopsida; Poales; Poaceae;
Spermatroideae; Oryzeae; Oryza.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             CB647704

858 bp mkww 1111cat wow oSJNEb10L21.r OSJNEb Oryza sativa (japonica cultivar-group) clone OSJNEb10L21 3', mkNA sequence.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            BACKWARD: gga aac agc tat gac cat g
Plate: 10 row: L column: 21
Seq primer: gga aac agc tat gac cat
Location/Qualifiers
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          between rice and Magnaporthe grisea Unpublished (2003)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Jantasuriyarat, C., Lu,G., Gowda,M., Hatfield,J., Zhou,B., Mazu Kudrna,D., Dean,R., Soderlund,C., Wing,R. and Wang,G. Large-scale identification of ESTs involved in the interaction
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       FORWARD: gta aaa cga cgg cca gtg
BACKWARD: gga aac agc tat gac cat
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 PCR PRimers
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      CB647704.1 GI:29642697
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CTTTCTCTCCTCCTCGCCTCGCACCTGTACTGCACGCTCCAGGCCGTCGACCTCCGCGCG 1668
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 CTCGAG 26
AGGTGATGAACGGCAAGCCGGAGTACACCGACCACCTGACCCACAAGCTGAAGCAC---C
                                   TGATGTTCGACGCCAACATCCTCGCCGTCCTGTCCGAGGTGCTCTCGGCCGGTGTTCTGCG
                                                                                                                GTCTGCACGACTCGCACATGCTCTCGCTCTCTCGCAGGCCTTGACGGCTCTCACGGTGG
                                                                                                                                                        CCAAGGAAGGTCTCGCCATCGTCAATGGCACGTCTGTGGGGGTCGGCGCTCGCGGCCACCG
                                                                                                                                                                                              CGAAGGAGGTCTCGGTCTGGTCAACGGAACGGCCGTCTCCGCCTCGATGGCGACCCTCA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               CTCAAGCTCATGACCTCCACCTACATCGTCGCCCTGTGCCAGGCCGTAGACCTTCGCCAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              (bases 1 to 858)
                                                                                                                                                                                                                                     Conservative
                                                                                                                                                                                                                                                                                                                                                                                                             /organism="Oryza sativa (japonica cu
/mol type="mRNA"
/cultivar="Wipponbare"
/db_xref="taxon:39947"
/clone="OSUNED10121"
/tissue_type="Leaf"
/dev_stage="3_week"
/lab_host="DH10B"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Rod Wing
                                                                                                                                                                                                                                                                                                                                   /clone_lib="OSJNEb"
/note="Vector: pBluescript II XS +; Site_1: EcoRI; Site_2: XhoI; 24 hrs after innoculation with Rice Blast (Che 86061)"
                                                                                                                                                                                                                                                      10.9%;
                                                                                                                                                                                                                                     ٥.
                                                                                                                                                                                                                                                      Score 263; DB 14;
Pred. No. 2.8e-26;
                                                                                                                                                                                                                                     Mismatches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 P.O.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   φ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Box 210088,
                                                                                                                                                                                                                                                                       Length
                                                                                                                                                                                                                                       Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           cultivar-group)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Tucson,
                                                                                                                                                                                                                                                                             858;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   EST 08-APR-2003
                                                                                                                                                                                                                                       9,
                                                                                                                                                                                                                                     Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Mazur,
    682
                                       1018
                                                                                                                                                                                                  898
                                                                               739
                                                                                                                       958
                                                                                                                                                            799
```

```
밁
                                                                                                                        Ś
                                                                                                                                                                        밁
                                                                                                                                                                                                            5
                                                                                                                                                                                                                                                          맑
                                                                                                                                                                                                                                                                                                   Ş
                                                                                                                                                                                                                                                                                                                                                                                    Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                  В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      DЬ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          뭐
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            맑
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ś
                                                                                                                                                                                                                                                                                                                                                                                         1379
                             1616 TCCTTCTCGCCTCGCACCTGTACTGCACGCTCCAGGCCGTCGACCTCCGCGCGATGGAG 1674
                                                                                                                             1556
                                                                                                                                                                                                 1496 GCCACCTTGCCAACCCGGTCACTACCTTCGTCCAGCCCGCAGAGATGGGCAACCAGGCCG 1555
                                                                                                                                                                                                                                                                                   1436 CGCTCAACTATCACGGCAAGGGCTTGGACATTCACATCGCTTACGCTTACGCTTCGGAGCTCG 1495
                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1319
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1199
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1139
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1079
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1019
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1259 AGAACAAGCAGACCGCGCACGGCGAACTTCCAGGCGTCGGCTGTCTCGATTCGATGG 1318
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              564
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                623
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  681
                                                                                 144 TGAACTCGCTGGGTCTCGTCTCGGCCAGGAAGACCCTGGAGGCGGTGGACATCCTCAAGC 85
                                                                                                                                                                   264
                                                                                                                                                                                                                                                                                                                                                324
                                                                                                                                                                                                                                                                                                                                                                                                                                    384
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 444 ACCGCGGCAAGGCGCCCCACGGCGAACTTCCAGGGCACCCCCATCGGTGTGTCCATGG 385
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      504 CCACCAAGTCCATCGAGCGCGAGGTCAACTCCGTGAACGACCACCACCGGTGATCGACGTCC 445
84
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            - CATGAGCCACGCCAAGAAGGTGAACGAGATGGACCCGCTGCTGAAGCCGAAGCAGGACA 565
                                                                                                                      TCAACTCGCTCGCTCATCTCCGCGGGGGCCACGACGACGACGACGACGACGTCCTTTCTC 1615
                                                                                                                                                                                                                                                          GCTTGGACTACGGGTTCAAGGGCACCGAGATCGCCATGGCCTCCTACTGCTCTGAGCTCC 205
                                                                                                                                                                                                                                                                                                                                              TOGTGAACGAGTTCTACAACAACGGGCTGACCTCCAACCTGGCCGGCAGCCGCAACCCGA 265
                                                                                                                                                                                                                                                                                                                                                                                       TECTCAACECTECATEAACCECECCTECCTTCETECCTCECTE---CCEAGGACCCET 1435
                                                                                                                                                                                                                                                                                                                                                                                                                             ACAACGCCCGTCTCGCCATCGCCAACATCGGCAAGCTCATGTTCGCGCAGTTCTCCGAGC 325
                                                                                                                                                                                                                                                                                                                                                                                                                                                               AGAAGACCAGGCTCGACTCGCCCTCATCGGCAAGCTCAACTTCACGCAGTGCACCGAGT 1378
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CCTACTCGACTCTCGCCTCGAGAACAACACGACGACGACGACGACCGCCTCCTCGACGTCG 1258
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          GGTACGCGCTCCGCACGTCGCCACTCGCCCCGCAGATCGAGGTCATCCGCGCCCG 505
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       GCTACCCGCTCCGCACGTCGCCTCAGTTCCTCGGCCCGCTCGTGGAGGACATGATGCACG 1198
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    ccerreaecaceaegaegaegreaaegreaaegaegaegaegaegarrerrececeaegaec
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             ACCCTGGGTCGATCGAGGCCGCCGTCATCATGGAGCACATCCTCGCCGGGAGCTCGTT-- 624
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         ACCCCGGCCAGGTCGAGGTCGCGCGCAACATCCGCACGCTCCTTTCCGGCTCGTCGTTTG 1078
TCATGACCTCCACCTACATCGTCGCCCTGTGCCAGGCCGTCGACCTTCGCCACCTCGAG 26
                                                                                                                                                                   145
```

Search completed: September 12, 2004, 04:20:22 Job time: 9130.4 secs

```
Minimum
Maximum
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Run
                                                                                                                                             Database
                                                                                                                                                                            Post-processing: Minimum Match 0%
Maximum Match 100%
Listing first 45 summaries
                                                                                                                                                                                                                                                                                                       Total number of hits satisfying chosen parameters:
                                                                                                                                                                                                                                                                                                                                            Searched:
                                                                                                                                                                                                                                                                                                                                                                                               Scoring table:
                                                                                                                                                                                                                                                                                                                                                                                                                                 Sequence:
                                                                                                                                                                                                                                                                                                                                                                                                                                                  Title:
Perfect score:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            OM protein -
                                                                                                                                                                                                                                                    BB DB
                                                                                                                                                                                                                                                    seq length: 0
seq length: 2000000000
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          protein search, using sw model
A Geneseq_29Jan04:*

1: geneseqp1980s:*
2: geneseqp1990s:*
3: geneseqp2000s:*
4: geneseqp2001s:*
5: geneseqp2001s:*
6: geneseqp2003as:*
7: geneseqp2003as:*
8: geneseqp2004s:*
                                                                                                                                                                                                                                                                                                                                                                          BLOSUM62
Gapop 10.0 , Gapext 0.5
                                                                                                                                                                                                                                                                                                                                                                                                                                 US-09-939-408A-13
3610
1 MAPSLDSLATTLANGFTNGS.....RIYEAIKDGRINHVLVKMLA 720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        September
                                                                                                                                                                                                                                                                                                                                            1586107 seqs, 282547505 residues
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               GenCore version 5.1.6
Copyright (c) 1993 - 2004 Compugen Ltd.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            9
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        2004, 09:49:43; Search time 88.6307 Seconds (without alignments)
2295.302 Million cell updates/sec
                                                                                                                                                                                                                                                                                                              1586107
```

Pred. No. is the number of results predicted by chance to have a score greater than or equal to the score of the result being printed, and is derived by analysis of the total score distribution.

Result				;	j	
		, G	Length	BB	ID	Description
1	3608		720	σ		Abb07690 R. gramin
N	3608	99.9	720	σ	AAE27938	938
ω	77	•	726	ហ	$\circ$	94 F
4.	77	•	726	v	794	Aae27942 Phenylala
<b>υ</b>	73		720	UT	27	٠,
on.	61		716	μ	8	Sequen
7	61		716	$\vdash$	051	Aap80513 L-phenyla
ထ	13	•	716	ហ	ABB07693	7693
9	61	72.4	716	ψı	AAE27941	941
10	13		716	'n	265	0653
11	2614	•	716	v	AAE16389	6389
12	5	72.4	716	σ	194	Abg71948 R. glutin
13	2614	•	716	7	ADE36054	6054
14	2613	٠	716	ຫ	AAE20660	20660 Rh
15	2613	•	716	σ	195	71951
16	13	72.4	716	ហ	990	20665 R.
17	13	72.4	716	ຫ	990	e20668 R.
18	2612	72.4	716	ហ	AAE20654	e20654
19	2612	72.4	716	υī	AAE16390	e16390 Kh
20	2612	•	716	9	ABG71955	g71955
21	5		716	7	ADE36056	6056 Rh
22	σ	72.3	716	Н	109	81099 Sequence
23	60		716	7	607	36076 Rhodospo
24	2608		716	7	ADE36074	6074
25	2607		716	Ų	AAE20663	Aae20663 Rhodotoru

The invention relates to an isolated and purified yeast phenylalanine ammonia lyase (PAL) polypeptide. The PAL encoding polynucleotide or a host cell comprising the polynucleotide is useful for the production of L-PAL, by adding the polynucleotide or the host cell to a composition comprising trans-cinnamic acid, or trans-cinnamate and ammonia; and for

Claim 9; Fig 1; 135pp; English

45	44	43	42	41	40	39	38	37	36	ω 5	34	33	32	31	30	29	28	27	26	
2598	2598	2598	2599	2599	2599	2600	2601	2603	2603	2603	2603	2603	2604	2605	0.9	2606	60	2607	2607	
						72.0			•						•	•	•	•	•	
716	716	716	716	716	716	716	716	716	716	716	716	716	716	716	716	716	716	716	716	
7	7	ហ	7	თ	v	۲	7	σ	σ	ຫ	ຫ	ຫ	7	7	σ	7	ຫ	7	σ	
ADE36072	ADE36058	AAE20664	ADE36070	ABG71950	65	ထ	ADE36064	ABG71953	ABG71952	AAE20666	AAE20661	AAE20662	ADE36066	ADE36062	AAE20711	ADE36060	AAE20667	ADE36068	ABG71954	-
Ade36072 R	e36058	e20664	07.0956	0.567/8	065	p95783	36064	71953	1952	20666	e20661	e20662	e36066	e36062	20711	6060	e20667	36068	g71954	
Rhodospor	Knodospor	. grucin	isopo	. grucin	Ä	L-phenyla	rodspor	. grucin	R. glutin	. giutin	Khodotoru	Rhodotoru	Knodospor	rodepor	R. glutin	Khodospor	. glutin	Rhodospor	. glutin	

## ALIGNMENTS

```
ABBOTT 1
ABBOT 10
ABBOT 
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Location/Qualifiers
Misc-difference 153
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               PAL; yeast; phenylalanine ammonia lyase; cinnamic acid; circytostatic; anti-HIV; virucide; nootropic; dermatological;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         R. graminis PAL polypeptide.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                10-JUN-2002
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        ABB07690;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        ABB07690 standard; protein; 720 AA.
                                                                                                                                                                                                                                                                               Phenylalanine ammonia lyase polypeptide and polynucleotide useful for treating mammal having disease or disorder from phenylketonuria, cancer, human immunodeficiency virus infection and human cytomegalovirus infection.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                        N-PSDB; ABA95240, ABA95251.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      WPI; 2002-268973/31.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Yoshida RK,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         24-JUL-2000; 2000US-00624693.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         24-JUL-2001; 2001WO-US023270.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    31-JAN-2002.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        WO200208402-A2
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Rhodotorula graminis.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             gene therapy.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 (PCBU-) PCBU SERVICES INC.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Kootstra AB;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    (first entry)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            /note= "encoded by GYC"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     'label= Val or Ala
```

```
RESULT 2
AAE27938
ID AAE2
XX
AC AAE2
XX
DT 27-D
XX
DE Rhod
XX
KW Yeas
                                                                                                                                    밁
                                                                                                                                                 Š
                                                                                                                                                                   용양
                                                                                                                                                                                                             뮍
                                                                                                                                                                                                                                Ş
                                                                                                                                                                                                                                                    Ъ
                                                                                                                                                                                                                                                                         Ş
                                                                                                                                                                                                                                                                                                  В
                                                                                                                                                                                                                                                                                                                δ
                                                                                                                                                                                                                                                                                                                                     당
                                                                                                                                                                                                                                                                                                                                                         Ş
                                                                                                                                                                                                                                                                                                                                                                                 ф
                                                                                                                                                                                                                                                                                                                                                                                                Ş
                                                                                                                                                                                                                                                                                                                                                                                                                         Вb
                                                                                                                                                                                                                                                                                                                                                                                                                                          S
                                                                                                                                                                                                                                                                                                                                                                                                                                                              Дb
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          888888888
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Query Match
Best Local Sim
Matches 720;
  Yeast; phenylalanine
                      Rhodotorula
                                          27-DEC-2002
                                                                                  AAE27938
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           improving the production of PAL, its analog or another optically active unnatural amino acid having PAL-like structure. The PAL polymucleotides are useful for treating a mammal having a disease, disorder or condition selected from phenylketonuria, cancer, human immunodeficiency virus infection and human cytomegalovirus infection. The present sequence represents a R. graminis PAL polypeptide
                                                                                                                                    199
                                                                                                                                                       661
                                                                                                                                                                           601
                                                                                                                                                                                              601
                                                                                                                                                                                                                   541
                                                                                                                                                                                                                                      541
                                                                                                                                                                                                                                                          481
                                                                                                                                                                                                                                                                              481
                                                                                                                                                                                                                                                                                                  421
                                                                                                                                                                                                                                                                                                                       421
                                                                                                                                                                                                                                                                                                                                           361
                                                                                                                                                                                                                                                                                                                                                               361
                                                                                                                                                                                                                                                                                                                                                                                                      301
                                                                                                                                                                                                                                                                                                                                                                                   301
                                                                                                                                                                                                                                                                                                                                                                                                                          241
                                                                                                                                                                                                                                                                                                                                                                                                                                              241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                   181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      61
                                                                                                                                standard;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Similarity
                                                                                                                                                                                       AFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAISLTREVRNRFWQTPSSQAPAHA
                                                                                                                                                                                                                                                        AYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQAV
                                                                                                                                                                         AFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAISLTREVRNRFWQTPSSQAPAHA
                                                                                                                                                                                                                DLRAMELDFKKQFDPLLPTLLQQHLGTGLDVNALALEVKKALNKRLEQTTTYDLEPRWHD
                                                                                                                                                                                                                              DLRAMELDFKKQFDPLLPTLLQQHLGTGLDVNALALEVKKALNKRLEQTTTYDLEPRWHD
                                                                                                                                                                                                                                                                        AYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQAV 540
                                                                                                                                                                                                                                                                                               SAVSISMEKTRLALIGKLNFTQCTELLNAAMNRGLPSCLAAEDPSLNYHGKGLDIHIA
                                                                                                                                                                                                                                                                                                           SAVSISMEKTRLALALIGKLNFTQCTELLNAAMNRGLPSCLAAEDPSLNYHGKGLDIHIA
                                                                                                                                                                                                                                                                                                                                       EGILRODRYPLRTSPOFLGFLVEDMMHAYSTLSLENNTTTDNPLLDVENKQTAHGGNFQA
                                                                                                                                                                                                                                                                                                                                                    EGILRQDRYPLRTSPQFLGFLVEDMMHAYSTLSLENNTTTDNPLLDVENKQTAHGGNFQA
                                                                                                                                                                                                                                                                                                                                                                                           ALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEVKYKDD
                                                                                                                                                                                                                                                                                                                                                                                                                       VLHEGTEKIMFAREAISLFGLEAVVLGPKEGLGLVNGTAVSASMATLSLHDSHMLSLLSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                       VLHEGTEKIMFAREAISLFGLEAVVLGPKEGLGLVNGTAVSASMATLSLHDSHMLSLLSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                           SLTRGHSAVRLVVLEALTNFLNHRITFIVPLRGSISASGDLSPLSYIAGAITGHPDVKVH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      GFGGSADTRTEDÁVSLQKÁLÍEHQLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIRVN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GFGGSADTRTEDAVSLQKALIEHQLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIRVN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            PTDDVVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSVYGVTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      MAPSLDSLATTLANGFTNGSHAAPTKSAAGPTSALRRTPGLDGHAAHQSQLEIVQELLSD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     MAPSIDSLATTLANGFTNGSHAAPTKSAAGPTSALRRTPGLDGHAAHQSQLEIVQELLSD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          720
                                                                                                                                                                                                                                                                                                                                                                                ALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                SLTRGHSAVRLVVLEALTNFLNHRITPIVPLRGSISASGDLSPLSYIAGAITGHPDVKVH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               PTDDVVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSVYGVTT
                     graminis
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ilarity 100.0%;
Conservative
                                          (first
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          A
                                                                                 protein;
                                         entry)
                     PAL
  ammonia
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     99.9%;
                     protein
                                                                                 720
  lyase;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Score 3608; DB 5; ; Pred. No. 1.3e-306; 0; Mismatches 0;
                                                                                 ₽
                     #
  PAL;
  C
 4.3.1.5;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Indels
phenylketonuria;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               0;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Gaps
                                                                                                                                                    720
                                                                                                                                                                         660
                                                                                                                                                                                           660
                                                                                                                                  720
                                                                                                                                                                                                                 600
                                                                                                                                                                                                                                   600
                                                                                                                                                                                                                                                        540
                                                                                                                                                                                                                                                                                                480
                                                                                                                                                                                                                                                                                                                   480
                                                                                                                                                                                                                                                                                                                                        420
                                                                                                                                                                                                                                                                                                                                                           420
                                                                                                                                                                                                                                                                                                                                                                                                   360
                                                                                                                                                                                                                                                                                                                                                                                                                                          300
                                                                                                                                                                                                                                                                                                                                                                               360
                                                                                                                                                                                                                                                                                                                                                                                                                        300
                                                                                                                                                                                                                                                                                                                                                                                                                                                               240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       180
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            180
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               120
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   120
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               0
                                  Ş
                   뮍
                                                          В
                                                                            Š
                                                                                                                   Ś
                                                                                                 밁
                                                                                                                                        B
                                                                                                                                                          Š
                                                                                                                                                                               Дb
                                                                                                                                                                                                   Š
                                                                                                                                                                                                                                                                                                        В
                                                                                                                                                                                                                                        Ş
                                                                                                                                                                                                                                                                                                        Sequence
                                                                                                                                                                                                                                                                                                                                                                                                                                                Novel isolated and purified Rhodocorula phenylalanine ammonia lyase polypeptide, useful for treating a mammal having phenylketonuria, continuan immunodeficiency virus or human cytomegalovirus infection.
                                                                                                                                                                                                                                                                                                                             protein
                                                                                                                                                                                                                                                                                                                                                                                                                             Claim 26; Page 29-31; 74pp; English.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           N-PSDB;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Yoshida
                  301
                                    301
                                                          241
                                                                            241
                                                                                                 181
                                                                                                                                         121
                                                                                                                     181
                                                                                                                                                             121
                                                                                                                                                                                61
                                                                                                                                                                                                    61
                                                                                                                                                                                                                        ட
```

```
WPI; 2002-690616/74.
                                                                                                         24-JUL-2000;
24-JUL-2001;
                                                                                                                                                       24-AUG-2001; 2001US-00939408
                                                                                                                                                                                      01-AUG-2002
                                                                                                                                                                                                                                                                               Key
Misc-difference
                                                                                                                                                                                                                                                                                                                             Rhodotorula
                                                                                                                                                                                                                                                                                                                                                       cancer; human immunodeficiency virus infection; HIV; q
human cytomegalovirus infection; cytostatic; virucide
                                                                           (PCBU-) PCBU
                                                                                                                                                                                                                  US2002102712-A1
                                            RK,
AAD45812.
                                                                                                                                                                                                                                                                                                                             graminis.
                                                                                                         2000US-00624693.
2001WO-US023270.
                                                                           SERVICES
                                                                                                                                                                                                                                                                               153
                                                                                                                                                                                                                                                                                            Location/Qualifiers
                                                                                                                                                                                                                                                                  _abel= Val,
                                                                          INC.
                                                                                                                                                                                                                                                "Encoded by GYC"
                                                                                                                                                                                                                                                                                                                                                                    gene
                                                                                                                                                                                                                                                                                                                                                                      therapy; hCMV;
```

The present invention relates to yeast (e.g. Rhodotorula) phenylalaning ammonia lyase (PAL; EC 4.3.1.5) proteins and polynucleotides encoding such proteins. PAL sequences are useful for producing L-phenylalanine. They are useful for treating mammals having diseases, disorders or conditions that would benefit from treatment with PAL proteins such as phenylketonuria, cancer, human immunodeficiency virus infection (HIV) or numan cytomegalovirus (hCMV) infection. Sequences of the invention are also used in gene therapy. The present sequence is R. graminis PAL phenylalanine des encoding 9

cancer,

720 AA;

```
Query Match
Best Local Similarity
Matches 720; Conserv
  361
                                                               ALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEVKVKDD
                                                                                                                                                                                             SLTRGHSAVRLVVLEALTNFLNHRITPIVPLRGSISASGDLSPLSYIAGAITGHDDVXVH
                                                                                                                                          VLHEGTEKIMFAREAISLFGLEAVVLGPKEGLGLVNGTAVSASMATLSLHDSHMLSLLSQ
                                                                                                                                                                                                                                                                                                      GFGGSADTRTEDAVSLQKALIEHQLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIRVN
EGILRQDRYPLRTSPQFLGPLVEDMWHAYSTLSLENNTTTDNPLLDVENKQTAHGGNFQA
                                     ALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEVKVKDD
                                                                                                                   VLHEGTEKIMFAREAISLFGLEAVVLGPKEGLGLVNGTAVSASMATLSLHDSHMLSLLSQ
                                                                                                                                                                                                                                                                            GFGGSADTRTEDAVSLQKALIEHQLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIRVN
                                                                                                                                                                                                                                                                                                                                                        PTDDVVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSVYGVTT
                                                                                                                                                                                                                                                                                                                                                                               PTDDVVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSVYGVTT
                                                                                                                                                                                                                                                                                                                                                                                                                                      MAPSIDSLATTLANGFINGSHAAPTKSAAGPTSALRRTPGIDGHAAHQSQLEIVQEILSD
                                                                                                                                                                                                                                                                                                                                                                                                                                                               MAPSLDSLATTLANGFTNGSHAAPTKSAAGPTSALRRTPGLDGHAAHQSQLEIVQELLSD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      99.9%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Score 3608; DB 5; ; Pred. No. 1.3e-306; 0; Mismatches 0;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 0
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Gaps
                                                                             360
                                                                                                                   300
                                                                                                                                                         300
                                                                                                                                                                                               240
                                                                                                                                                                                                                                    240
                                                                                                                                                                                                                                                                                                                180
                                          360
                                                                                                                                                                                                                                                                            180
                                                                                                                                                                                                                                                                                                                                                        120
                                                                                                                                                                                                                                                                                                                                                                                              120
                                                                                                                                                                                                                                                                                                                                                                                                                                    60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                            60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    0
```

```
ABB07694
ABB07694
ABB07694
ABB07694
AC ABBC
XX 29-A
DT 07-A
DT 10-C
DT 10-C
XX Rhoc
XX CPL
KW CPL
KW
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 D,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                29-AUG-2003
07-AUG-2003
10-JUN-2002
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Key Location/Qualifiers Misc-difference 1, .726
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Rhodotorula graminis.
Rhodotorula mucilaginosa.
Rhodotorula mucilaginosa.
Rhodosporidium toruloides.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         PAL; yeast; phenylalanine ammonia lyase; cinnamic acid; cinnamate; cytostatic; anti-HIV; virucide; nootropic; dermatological; gene the
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          ABB07694;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             ABB07694 standard; protein;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         31-JAN-2002
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           WO200208402-A2
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      consensus; enzyme
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Rhodotorula
                                                                                                                                Phenylalanine ammonia lyase polypeptide and polynucleotide useful treating mammal having disease or disorder from phenylketonuria, chuman immunodeficiency virus infection and human cytomegalovirus
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 24-JUL-2001; 2001WO-US023270
                                                                                                                                                                                                                                              N-PSDB; ABA95244.
                                                                                                                                                                                                                                                                                                                                                                                                                                 24-JUL-2000; 2000US-00624693
                                                     Claim 10; Fig 2; 135pp;
                                                                                                                                                                                                                                                                                                                          Yoshida RK,
                                                                                                                                                                                                                                                                                                                                                                            (PCBU-)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                661
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     601
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        601
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          541
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                541
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     481
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       481
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             421
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               421
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 661
                                                                                                                                                                                                                                                                       2002-268973/31.
                                                                                                                                                                                                                                                                                                                                                                               PCBU
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               DLRAMELDFKKQFDPLLFTILLQQHLGTGLDVNALALEVKKALNKRLEQTTTYDLEPRWHD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     AYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQAV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       AYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQAV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            SAVSISMEKTRLALALIGKLNFTQCTELLNAAMNRGLPSCLAAEDPSLNYHGKGLDIHIA 480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  EGILRODRYPLRTSPOFLGPLVEDYMHAYSTLSLENNTTTDNPLLDVENKQTAHGGNFQA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          YLSPRTRVLYSFVREELGVQARRGDVFVGVQQETIGSNVSRIYEAIKDGRINHVLVK%LA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        AFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAISLTREVRNRFWQTPSSQAPAHA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          DLRAMELDFKKQFDPLLFTLLQQHLGTGLDVNALALEVKKALNKRLEQTTTYDLEFRWHD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          SAVSISMEKTRLALIGKLNFTQCTELLNAAMNRGLPSCLAAEDPSLNYHGKGLDIHIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              YLSPRTRVLYSFVREELGVQARRGDVFVGVQQETIGSNVSRIYEAIKDGRINHVLVKMLA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                (revised)
 (revised)
 (first entry)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             PAL consensus polypeptide sequence
                                                                                                                                                                                                                                                                                                                            Kootstra
                                                                                                                                                                                                                                                                                                                                                                               SERVICES INC.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 /note= "Xaa is any amino acid;
consensus at that position"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           LLSSSPSANVTLTAVNAWKVASAEKAISLTREVRNRFWQTPSSQAPAHA
                                                                                                                                                                                                                                                                                                                            AB;
                                                        English.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             726
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             A
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     indicates
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    gene therapy;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           660
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                660
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        600
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      600
```

The invention relates to an isolated and purified yeast phenylalanine

RESULT

```
ត្តអត្តសត្តសត្តសត្តសត្ត
                                                                                                                                                                                                                                                                                                                                                                                                                                δÃ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                       망
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             맑
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Š
                                                                                                                                                             Š
                                                                                                                                                                                                                             Š
                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                           Š
                                                                                                                                                                                                                                                                                                                                  뮍
                                                                                                                                                                                                                                                                                                                                                                  Ş
                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                          S
                                                                                                                               В
                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Matches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Query Match
Best Local (
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             ammonia lyase (PAL) polypeptide. The PAL encoding polynucleotide or a host cell comprising the polynucleotide is useful for the production of L-PAL, by adding the polynucleotide or the host cell to a composition comprising trans-cinnamic acid, or trans-cinnamate and ammonia; and for improving the production of PAL, its analog or another optically active unnatural amino acid having PAL-like structure. The PAL polynucleotides are useful for treating a mammal having a disease, disorder or condition selected from phenylketonuria, cancer, human immunodeficiency virus infection and human cytomegalovirus infection. The present sequence represents a consensus polypeptide sequence of the Rhodctorula PAL. (Updated on 07-AUG-2003 to correct OS field.) (Updated on 29-AUG-2003 to standardise OS field)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Sequence 726 AA;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               120
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                564;
                                                                                                                                                                                                                                                                                                                                                                                                                                       360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                         301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            180
                               715
                                                               661
                                                                                                                                 601
                                                                                                                                                                   595
                                                                                                                                                                                                    541
                                                                                                                                                                                                                                    539
                                                                                                                                                                                                                                                                    481
                                                                                                                                                                                                                                                                                                      479
                                                                                                                                                                                                                                                                                                                                      421
                                                                                                                                                                                                                                                                                                                                                                     419
                                                                                                                                                                                                                                                                                                                                                                                                         361
721
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1 MAPSIDSLATTLANGETNGSHAAPTKSAAGPTSALRRTPGLDGHAAHQSQLEIVQELLSD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Similarity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     QALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHBEEVKVKD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         HVXHEGXEKIMXAREAIALFGLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     HVLHEGTEKIMFAREAISLFGLEAVVLGPKEGLGLVNGTAVSASMATLSLHDSHMLSLLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            NSLTRGHSAVRLVVLEALTNFLNHRITBIVPLRGSISASGDLSPLSYIAGAITGHDDVKV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   TGFGGSADTRTEDAVSLQKALIEHQLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIRV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             PXTDDXXELDGYSLTLGDVVGAARKGRXVRVXDSDETRXKIDKSVEFLRXQLXNSVYGVT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           P-TDDVVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSVYGVT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 WAPSIDSIATSXANGXXNGXHAAXXASXXXXXXXXXXAXAGSXLPTTXXTQLDIVEXXLAD
                                                                                                                                                                                                                                                                  AAAYTSELGHLANPUTTHVQPAEMGNQAVNSLALISARRTAEANDVLSULLATHLYCVLQ
                                                                                                                                                                                                                                                                                                                                    DEGILRODRYPLRTSPORTUGELVEDMMHAYSTLSLE-UNTTTDUPLLDVENKOTAHGGNF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            TGFGGSADTRTEDATSLOKALLEHOLGGVLÞTSXDSFXLGRGLENSLÞLEVVRGAMTIRV
                                                                                                                                                                                                                                                                                                                                                           QASAVSISMEKTRLALALIGKLNFTQCTELLNAAMNRGLPSCLAABDPSLNYHGKGLDIH 478
                                                                                                                                                                                                                                                                                                                                                                                                       DEGILRODRYPLRTSPOWLGPLVSDMIHAHAVLSLEAGOSTTDNPLIDVENKXTHHGGNF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                       QALTALTVEAMVGHAGSFHPFLHDVTRPHPTQIEVARNIRTLLEGSXFAVHHEEEVKVKD
 LVKMLA
                                                               SSPALXYLSPRIRVLYSFVREELGVKARRGDVFLGXQEVTIGSNVSRIYEAIKSGRINXV
                                                                                          QAPAHAYLSPRTRVLYSFVREELGVQARRGDVFVGVQQETIGSNVSRIYEAIKDGRINHV
                                                                                                                                                             EPRWHDAFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAISLTREVRNRFWQTPSS
                                                                                                                                                                                                 AVDÍRAMEFEFKKÓFKÞXXXXLÍXÓHFÓXXXTXXXXXXEÍXXKVXKXÍXKRÍEÓTNSYÐÍ
                                                                                                                                                                                                                                 AVDLRAMELDFKKOFDPLLFTLLQQHLGTGLDVNA----LALEVKKALNKRLEQTTTYDL
                                                                                                                                                                                                                                                                                                IAAYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTIQ 538
                               LVKMLA 720
                                                                                                                                   EPRWHDAFSXATGTVVEXLSSXXXXXVSLAAVNAWKVAXAEKAISLTRXVRXXFWXAPSS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                76.7%; Score 2770; DB 5; llarity 77.7%; Pred. No. 3.7e-233; Conservative 40; Mismatches 116;
   726
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Length 726;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       σı
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    179
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      120
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    119
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 359
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 299
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 239
                                                                                                                                                                                                                                         594
                                                                                                                                                                                                                                                                         540
                                                                                                                                                                                                                                                                                                                                                                                                              420
                                                                                                                                                                                                                                                                                                                                                                                                                                              418
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                300
                                                                                                        714
                                                                                                                                        660
                                                                                                                                                                          654
                                                                                                                                                                                                           600
```

```
AAE27942
ID AAE27942 standard; p.
XX
AC AAE27942;
XX
DT 06-AUG-2003 (revise)
DT 27-DBC-2002 (first,
DE Phenylalanine ammoni,
XX
Yeast; phenylalanine
KW Rey Inman 1 Loca
FT Misc-difference 726.
FT Novel 1solated and F PT Novel 1sol
                           Ş
                                                                       밁
                                                                                                       Ş
                                                                                                                                                            뮍
                                                                                                                                                                                         8
                                                                                                                                                                                                                                   Ď,
                                                                                                                                                                                                                                                                                   Ş
                                                                                                                                                                                                                                                                                                                                 Query Match
Best Local S
Matches 564
                                                                                                                                                                                                                                                                                                                                                                                                                                                      The present invention relates to yeast (e.g. Rhodotorula) phenylalanine ammonia lyase (PAL; EC 4.3.1.5) proteins and polynucleotides encoding such proteins. PAL sequences are useful for producing L-phenylalanine. They are useful for treating mammals having diseases, disorders or conditions that would benefit from treatment with PAL proteins such as phenylketonuria, cancer, human immunodeficiency virus infection (HIV) or human cytomegalovirus (hCMV) infection. Sequences of the invention are also used in gene therapy. The present sequence is PAL consensus protein. (Updated on 06-AUG-2003 to correct OS field.)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Novel isolated and purified Rhodotorula phenylalanine ammonia lyase polypeptide, useful for treating a mammal having phenylketonuria, continuan immunodeficiency virus or human cytomegalovirus infection.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               24-AUG-2001; 2001US-00939408
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Rhodotorula graminis.
Rhodotorula mucilaginosa.
Rhodosporidium toruloides.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Yeast; phenylalanine ammonia lyase; PAL; EC 4.3.1.5; phenylketonuria; cancer; human immunodeficiency virus infection; HIV; gene therapy; hCMV; human cytomegalovirus infection; cytostatic; virucide.
                                                                                                                                                                                                                                                                                                                                 Local Similarity
mes 564; Conserv
                                                                         121
                                180
                                                                                                              120
                                                                                                                                                            61
                                                                                                                                                                                                   61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  26; Page 47-48; 74pp; English.
                                                                                                                                                                                                                                              ۳
NSLTRGHSAVRLYVLEALTNELNHRITÞIVÞLRGSISASGDLSÞLSYIAGAITGHÞDVXV
                                                                                                                                                                                P-TDDVVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSVYGVT
                                                                                                                                                                                                                                                                              MAPSIDSLATTLANGFTNGSHAAPTKSAAGPTSALRRTPGLDGHAAHQSQLEIVQELLSD
                                                                TGFGGSADTRTEDATSLOKALLEHOLCGVLÞTSXDSFXLGRGLENSLÞLEVVRGAMTIRV
                                                                                         TGFGGSADTRTEDAVSLQKALIEHQLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIRV
                                                                                                                                                     PXTDDXXELDGYSLTLGDVVGAARKGRXVRVXDSDETRXKIDKSVEFLRXQLXNSVYGVT
                                                                                                                                                                                                                                          MAPSIDSIATSXANGXXNGXHAAXXASXXXXXXXXXXXAXAGSXLPTTXXTQLDIVEXXLAD
                                                                                                                                                                                                                                                                                                                                 Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    2000US-00624693
2001WO-US023270
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        SERVICES
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Kootstra
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      (revised)
(first entry)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            ammonia lyase
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Location/Qualifiers 726. .719
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                /note=
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  protein;
                                                                                                                                                                                                                                                                                                                                                   76.7%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        INC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              "Xaa corresponds to unknown amino
                                                                                                                                                                                                                                                                                                                                 40;
                                                                                                                                                                                                                                                                                                                            Score 2770; DB 5;
Pred. No. 3.7e-233;
0; Mismatches 116;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          consensus protein
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      726
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    A
                                                                                                                                                                                                                                                                                                                                                                      Length 726;
                                                                                                                                                                                                                                                                                                                            Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              acid
                                                                                                                                                                                                                                                                                                                            9
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              residue"
                                                                                                                                                                                                                                                                                                                            Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                cancer,
                                                                  180
                                                                                                                                                     120
                                                                                                                                                                                                                                          60
                                                                                                                                                                                                                                                                                     60
  RESULT 5
AAE27943
ID AAE2
XX AAE2
AC AAE2
XX Yeas
XX Yeas
XX Yeas
XX Yeas
XX Canc
XW Canc
XW huma
AX Rhod
XX Rhod
XX Rhod
XX Rhod
XX Misc
FT Misc
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            日
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   망
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               γ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  맑
```

Misc-difference

note= "Encoded by

Ser,

Misc-difference

/note=

"Encoded by Thr,

Ala,

Ser DCV" BTC

label=

61y

Misc-difference

/note= 17

label=

6 |label= Val, Leu, P | "¤ncoded by

Phe

Misc-difference

note=

label=

"Encoded by

Phe

BTC

Misc-difference

/note= "Encoded 12

by BTC"

'label= Val, Leu, Phe

Misc-difference

Location/Qualifiers

```
Yeast; phenylalanine ammonia lyase; PAL; EC 4.3.1.5; phenylketonuria; cancer; human immunodeficiency virus infection; HIV; gene therapy; hC human cvtomegalovirus infection; cytostatic; virucide.
Rhodotorula graminis
                                                                                                                         Yeast phenylalanine ammonia lyase protein
                                                                                                                                                                  27-DEC-2002
                                                                                                                                                                                                           AAE27943;
                                                                                                                                                                                                                                                   AAE27943 standard;
                                                                                                                                                                                                                                                                                                                                                                                                                                    661
                                                                                                                                                                                                                                                                                                                                                                                                                                                                              655
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       601
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            595
                                                                                                                                                                                                                                                                                                                                                         721
                                                                                                                                                                                                                                                                                                                                                                                             715 LVKMLA 720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       541
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              539
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     481
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               479
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      421
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             419
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                181 NSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAITGHPDSKV
                                                                                                                                                                                                                                                                                                                                                      LVKMLA
                                                                                                                                                                                                                                                                                                                                                                                                                                                            QAPAHAYLSPRTRVLYSFVREELGVQAERGDVFVGVQQETIGSNVSRIYEAIKDGRINHV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               AAAYTSELGHLANPVTTHVQPAEMGNQAVNSLALISARRTAEANDVLSLLLATHLYCVLQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               IAAYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQ
                                                                                                                                                                                                                                                                                                                                                                                                                                    SSPALXYLSPRTRVLYSFVREELGVKARRGDVFLGKQEVTIGSNVSRIYEAIKSGRINXV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   EPRWHDAFSXATGTVVEXLSSXXXXXVSLAAVNAWKVAXAEKAISLTRXVRXXFWXAPSS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   EPRWHDAFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAISLTREVRNRFWQTPSS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   AVDLRAMEFEFKKOFXPXXXXLLXQHFGXXXTXXXXXXELXXKVXXXXLXXRLEQTNSYDL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           QASAVSISMEKTRLALALIGKLNFTQCTELLNAAMNRGLPSCLAAEDPSLNYHGKGLDIH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              DEGILRQDRYPLRTSPQFLGPLVEDMMHAYSTLSLE-NNTTTDNPLLDVENKQTAHGGNF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          AVDLRAMELDFKKOFDPLLPTLLQQHLGTGLDVNA----LALEVKKALNKRLEQTTTYDL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   QASAVXNTMEKTRLALALIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               DEGILRODRYPLRTSPOWLGPLVSDMIHAHAVLSLEAGOSTTDNPLIDVENKXTHHGGNF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              QALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEVKVKD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  HVXHEGXEKIMXAREAIALFGLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  QALTALTVEAMVGHAGSFHPFLHDVTRPHPTQIEVARNIRTLLEGSXFAVHHEEEVKVKD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       HVLHEGTEKIMFAREAISLFGLEAVVLGPKEGLGLVNGTAVSASMATLSLHDSHMLSLLS
                                                                                                                                                                  (first
                                                                                                                                                                                                                                                                                                                                                      726
                                                                                                                                                                                                                                                   protein;
                                                                                                                                                                  entry)
                                                                                                                                                                                                                                                   720
                                                                                                                         #2
                                                      therapy; hCMV;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          538
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         359
                                                                                                                                                                                                                                                                                                                                                                                                                                  720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                            714
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   660
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          654
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   600
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            594
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           418
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                240
```

\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\
Misc-difference
// // // // // // // // // // // // //
hncoded by
THG Or  PHCC"  YCG"  YCG"  ACH"  ACH"  BCC"  BCC"  BCC"  CGTB"  YAG"  VHG"  VHG"  AACH"  AACH
an in-frame
gln,
Pro, Leu
Misc-diff
Misc-difference   154
Misc-difference   154
Misc-difference   154
Misc-difference 154  Misc-difference 157  Misc-difference 159  Misc-difference 199  Misc-difference 199  Misc-difference 221  Misc-difference 222  Misc-difference 223  Misc-difference 223  Misc-difference 239  Misc-difference 241  Misc-difference 241  Misc-difference 241  Misc-difference 241  Misc-difference 241  Misc-difference 242  Misc-difference 241  Misc-difference 246  Misc-difference 251  Misc-difference 264  Misc-difference 275  Misc-difference 275  Misc-difference 276  Misc-difference 277  Misc-difference 276  Misc-difference 277  Misc-difference 277  Misc-difference 278  Misc-difference 278  Misc-difference 279  Misc-diff
Misc-difference 154  Abbel Sqr. Gly, Arg Misc-difference 159 Misc-difference 23bel Thr Misc-difference 23bel Thr Misc-difference 237  Misc-difference 237  Misc-difference 237  Misc-difference 237  Misc-difference 240  Misc-difference 251  Misc-difference 252  Misc-difference 253  Misc-difference 253  Misc-difference 254  Misc-difference 255  Misc-difference 256  Misc-difference 266  Misc-difference 266  Misc-difference 276  Misc-difference 277  M
Misc-difference 154  Misc-difference 157  Misc-difference 159  Misc-difference 199  Misc-difference 199  Misc-difference 221  Misc-difference 222  Misc-difference 223  Misc-difference 223  Misc-difference 239  Misc-difference 241  Misc-difference 241  Misc-difference 241  Misc-difference 241  Misc-difference 241  Misc-difference 242  Misc-difference 241  Misc-difference 246  Misc-difference 251  Misc-difference 264  Misc-difference 275  Misc-difference 275  Misc-difference 276  Misc-difference 277  Misc-difference 276  Misc-difference 277  Misc-difference 277  Misc-difference 278  Misc-difference 278  Misc-difference 279  Misc-diff

Misc.

```
Matches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Query Match
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Misc-difference
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Misc-difference
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Misc-difference
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Misc-difference
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Misc-difference
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Misc-difference
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Local
                    661
                                            601
                                                                   601
                                                                                             541
                                                                                                                                               481
                                                                                                                                                                      481
                                                                                                                                                                                                421
                                                                                                                                                                                                                         421
                                                                                                                                                                                                                                                  361
                                                                                                                                                                                                                                                                          361
                                                                                                                                                                                                                                                                                                    301
                                                                                                                                                                                                                                                                                                                            301
                                                                                                                                                                                                                                                                                                                                                    241
                                                                                                                                                                                                                                                                                                                                                                              241
                                                                                                                                                                                                                                                                                                                                                                                                        181
                                                                                                                                                                                                                                                                                                                                                                                                                                181
                                                                                                                                                                                                                                                                                                                                                                                                                                                          121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             551;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               difference
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              ۳
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     ۲
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Similarity
  YLSPRTRVLYSFVREELGVQARRGDVFVGVQQETIGSNVSRIYEAIKDGRINHVLVKMLA
                                        AFSFATGTVVELLSSSXXAKVSLAAVNAWKVASAEKAISLTRXVRDXFWXAPSSSSPALX
                                                        AFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAISLTREVRNRFWQTPSSQAPAHA
                                                                                         DLRAMEFEFKKQFDPXXXXLXXQHFGXALDGXELXDKVNXXLXXRLEQINSYDLEFRWHD
                                                                                                                 DLRAMELDFKKOFDPLLPTLLQQHLGTGLDVNALALEVKKALNKRLEQTTTYDLEFRWHD
                                                                                                                                                          AYASELGHLANPYTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQAV
                                                                                                                                                                                             AVANTMEKTRLALALIGKLNFTQLTEMLNAGMNRGXXSCLAAEDXSLSYHCKGLDIAAA
                                                                                                                                                                                                             SAVSISMEKTRLALALIGKLNFTQCTELLNAAMNRGLPSCLAAEDPSLNYHGKGLDIHIA
                                                                                                                                                                                                                                                                                                                                                                   VLHEGTEKIMFAREAISLFGLEAVVLGPKEGLGLVNGTAVSASMATLSLHDSHMLSLLSQ
                                                                                                                                            AYTSELXHLANPXTTHVQPREMGNQAVNSLALISARRXAEANDVLSLLLATHLYCXLQAV
                                                                                                                                                                                                                                                                                                                ALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                   GFGGSADTRTEDAVSLQKALIEHQLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIRVN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              MAPSIDSLATTIANGFTNGSHAAPTKSAAGPTSALRRTPGLDGHAAHQSQLEIVQELLSD
                                                                                                                                                                                                                                                EGITRODRYPTRTSPOWLGPTVSDMIHAHAVISTEAESTTDNPLIDVENKXTHHGGNFOA
                                                                                                                                                                                                                                                               EGILRQDRYPLRTSPQFLGPLVEDMMHAYSTLSLENNTTTDNPLLDVENKQTAHGGNFQA 420
                                                                                                                                                                                                                                                                                                                                                                                                                                                      GFGGSADTRTEDAISLOKALLEHQLCGXLXTSXXSFXLXRGLENSLPLEVVRGANTIRVN
                                                                                                                                                                                                                                                                                                ALTAXTVEAMVGHAGSFHXFLHDVTRPHPTQIEVARNIRTLLEGSXFAVHHEEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                   XXHEGXEKIMXAREAIALXGLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLSQ
                                                                                                                                                                                                                                                                                                                                                                                                     SLXRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSXLXYIAAAITGHPDXKXH
                                                                                                                                                                                                                                                                                                                                                                                                                   SLTRGHSAVRLVVLEALTNFLNHRITFIVPLRGSISASGDLSPLSYIAGAITGHPDVKVH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    PTDDXXELDGYTLTLXDVVGAARKGRXVRVQTXDEIRAKIDXXVEFLRXQLXNXVYXVTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       PTDDVVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSVYGVTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         MAPSXDSTATSXANGXXNXXHAAPXXXXTGATSXLXRPXXLAPPATQXTQLDIXEXILAD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        /label= Ile, Val
/note= "Encoded |
> 558
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    /note=
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        /note= "Encoded 562
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     /note=
559
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              /note=
557
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           536
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          /label= Lys, Glu
/note= "Encoded
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          'label= Thr, Ala, &
'note= "Encoded by
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      /note=
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                label= Ile,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           label= Thr, Ala,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        label= Met,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      abel= Thr,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              abel=
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      75.6%;
76.5%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                "Encoded
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               "Encoded
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          "Encoded
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      "Encoded
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Val
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             45;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              oded by VTB"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       . Glu,
d by v
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              val, a by v
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Score 2730;
Pred. No. 1
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Mismatches 124;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               γģ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    by HTC'
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     λq
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Gln
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Phe
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Ser
y DCG"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Pro
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Leu
Y VTC"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              VAG"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                GTB"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Leu
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ; DB 5;
1.2e-229;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Length 720;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           0
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Gaps
                                                                                                                   600
                                                                                                                                                                     540
                                                                                                                                                                                             480
                                                                                                                                                                                                                       480
                 720
                                                                                                                                           540
                                                                                                                                                                                                                                                420
                                                                                                                                                                                                                                                                                                 360
                                                                                                                                                                                                                                                                                                                         360
                                                                                                                                                                                                                                                                                                                                                  300
                                                                                                                                                                                                                                                                                                                                                                           300
                                                                                                                                                                                                                                                                                                                                                                                                    240
                                                                                                                                                                                                                                                                                                                                                                                                                              240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                180
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  120
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          60
                                                                                                                                                                                                                                                                                                                                                                                                                                                      180
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    60
                                                                                                                                                                                                                                                                                             멼
                                                                                                              Ś
                Ş
                                                               Ś
                                                                                         밁
                                                                                                                                          밁
                                                                                                                                                               Š
                                                                                                                                                                                            B,
                                                                                                                                                                                                                 Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                            Query Match
Best Local S
Matches 523
                                                                                                                                                                                                                                                                                                                       Inventors claim a recombinant plasmid conty. a DNA sequence coding for PAL with the SQ in AAP80501. Procedure for cloning the structural gene for PAL (AAN81101) is described as a reference example. The hybrid plasmid permits more efficient expression of PAL in E.coli. PAL is used for the prodn. of L-phenylalanine from cinnamic acid and ammonia (Updated on 25-MAR-2003 to correct PR field.) (Updated on 27-AUG-2003 to correct OS field.)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        27-AUG-2003
25-MAR-2003
19-NOV-1990
                                                                                                                                                                                                                                                                                                Sequence 716
                                                                                                                                                                                                                                                                                                                                                                                                                                                               Recombinant plasmid for expression of L-phenylalanine ammonia-lyase - having combined promoter of tac promoter and Pl promoter for enhanced
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 06-FEB-1987;
18-JUN-1987;
                                                                                                                                                                                                                                                                                                                                                                                                                         Example; Page 16-21; 37pp; English
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       WPI; 1988-229543/33
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 17-AUG-1988
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        EP278706-A.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Rhodosporidium
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Cinnamic acid;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     turoloides.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Sequence of L-phenylalanine
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         (MITK ) MITSUI TOATSU CHEM INC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    AAP83141
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           AAP83141;
                241
                                        175
                                                                181
                                                                                         115
                                                                                                                 121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   661
                                                                                                                                           55
                                                                                                                                                                   5
                                                                                                                                                                                                                    \vdash
                                                                                                                                                                                             μ
                                                                                                                                                                                                                                                           Similarity
SLTRGHSAVRLVVLEALTNFLNHRITPIVPLRGSISASGDLSPLSYIAGAITGHPDVKVH
                                                                                                      GFGGSADTRTEDAVSLQKALIEHQLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIRVN
                                                                                                                                                                                         MAPSIDSISHSFANG-----VASAKQAVNGASTNLAVAGSHLPTTQVTQVDIVEKMLAA
                                       SLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAISGHPDSKVH
                                                                                         GFGGSADTRTEDAISLQKALLEHQLCGVLPSSFDSFRLGRGLENSLPLEVVRGAMTIRVN
                                                                                                                                        PTDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVTT
                                                                                                                                                                  PTDDVVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSVYGVTT
                                                                                                                                                                                                                   MAPSIDSIATTIANGETNGSHAAPTKSAAGETSALRRTEGIDGHAAHQSQLEIVQELISD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                z
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    standard;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 YLSPRTRVLYSFVREELGVKARRGDVFLGKQEVTIGTNVSRIYEAIKXGXINHVLVKMLA
                                                                                                                                                                                                                                              Conservative
                                                                                                                                                                                                                                                                                                A
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Yoshino
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       (revised)
(revised)
(first en
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 87JP-00024705.
87JP-00152357.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   toruloides
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          expression vector
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       88EP-00301011
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    protein;
                                                                                                                                                                                                                                                        72.5%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        entry)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               ß
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Sone
                                                                                                                                                                                                                                              86;
                                                                                                                                                                                                                                            Score 2619; DB 1;
Pred. No. 6.2e-220;
16; Mismatches 102;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                ammonia lyase
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           ,
S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    ያ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Nakajima
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                (PAL)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               K
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Makiguchi
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                from
                                                                                                                                                                                                                                                                  Length 716;
                                                                                                                                                                                                                                              Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Rhodosporidium
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               z
```

14;

Gaps

ψı

180

240 174

300

120

τι 4,

114

Ş 뮍 Ş В Ş Ъ Ş В 5 뮰 Ş Вb 8 D, Ş 밁 5 В Ś В Ş 밁 Ś

```
В
                                                                                                                                                                                                                                                                                                                                                                                                                                      Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                            밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                             8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  ă
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      용
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ŕ
 Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 멍
                                                                                                                                                                                                                                        L-phenylalanine ammonialyase; PAL; foreign gene expression; culture temperature; expression regulation.
                                                                                                                                                                                                                                                                                      25-MAR-2003
12-NOV-1990
                                                                                                                                                                                                                                                                                                                  AAP80513;
                                                                                                                                                                                                                                                                                                                                    AAP80513 standard; protein; 716
                                                                 WPI; 1988-236895/34.
N-PSDB; AAN81116.
                                                                                                                                  19-FEB-1987;
18-JUN-1987;
                                                                                                                                                               18-FEB-1988;
                                                                                                                                                                                 24-AUG-1988
                                                                                                                                                                                                                    Rhodosporidium
                                                                                                                                                                                                                                                                   L-phenylalanine ammonialyase
                                   Regulation of expression of foreign gene in Escherichia coli - by maintaining temp. of culture at 40 deg. C or more to suppress expression.
                                                                                             Fukuhara N, Yoshino S,
 The PAL
                                                                                                                (MITK ) MITSUI TOATSU CHEM INC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  355
                                                                                                                                                                                                                                                                                                                                                                                                                         652
                                                                                                                                                                                                                                                                                                                                                                                                                                           959
                                                                                                                                                                                                                                                                                                                                                                                                                                                              595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                               596
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   535
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        475
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             415
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     361
                                                                                                                                                                                                                                                                                                                                                                                                      716
                                                                                                                                                                                                                                                                                                                                                                                    712 LKMLA 716
gene is expressed
                                                                                                                                                                                                                                                                                                                                                                                                      VKMLA 720
                                                                                                                                                                                                                                                                                                                                                                                                                         SPALSYLSPRTQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNVL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     VDLRAMELDFKKQFDFLLFTLLQQHLG---TGLDV-NALALEVKKALNKRLEQTTTYDLE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         ASAVSISMEKTRLALALIGKLNFTQCTELLNAAMNRGLPSCLAAEDPSLNYHGKGLDIHI 479
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  EGILRQDRYPLRTSPQWLGPLVSDLIHAHAVLTIEAGQSTTDNPLIDVENXTSHHGGNFQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              EGILRODRYFLRTSPOFLGFLVEDMWHAYSTLSLE-NNTTTDNFLLDVENKQTAHGGNFQ 419
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     SITAMTVEANVGHAGSTHPFLHDVTRPHPTQIEVAGNIRKLLEGSRPAVHHEBEVKVKDD 354
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            VVHEGKEKILYAREAMALFNLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLSQ 294
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       AAYTSELGHLANPYTTHVQPAEMANQAVNSLALISARRTTESNDVLSLLLATHLYCVLQA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         AAYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            AAAVANTMEKTRLGLAQIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         ALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHBEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                                                                                                  APAHAYLSPRTRVLYSFVREELGVQARRGDVFVGVQQETIGSNVSRIYEAIKDGRINHVL
                                                                                                                                                                                                                                                                                                                                                                                                                                                             PRWHDAFSFAAGTVVEVLSST---SLSLAAVNAWKVAAAESAISLTRQVRETFWSAASTS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                          PRWHDAFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAISLTREVRNRFWQTPSSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  IDLRAIEFEFKKOFGPAIVSLIDOHFGSAMTGSNLRDELVEKVNKTLAKRLEOTTSYDLV
                   Page 15-19; 36pp; English.
                                                                                                                                                                                                                                                                                      (revised)
(first entry)
                                                                                                                                                                                                                      toruloides
                                                                                                                                  87JP-00034397.
87JP-00152359.
                                                                                                                                                               88EP-00301356
                                                                                             Yamamoto
 in E.coli carrying
                                                                                                                                                                                                                                                                                                                                      A
                                                                                             7
                                                                                              Sone
                                                                                              ģ
  a recombinant plasmid
                                                                                               Suzuki M,
                                                                                                ĸ
                                                                                                                                                                                                                                                                                                                                                                                                                                             715
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     594
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          534
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            539
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               474
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    414
                                                                                                                                                                                                                                                                                                                                                                                                                                                               651
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  655
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       595
   RESULT 8
ABB07693
ID ABB0
XX
AC ABB0
XX
DT 07-A
DT 10-J
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        8888888
                                                                                                                                                                                                                               Ş
                                                                                                                                                                                                                                                   B
                                                                                                                                                                                                                                                                 Ş
                                                                                                                                                                                                                                                                                        B
                                                                                                                                                                                                                                                                                                          Ş
                                                                                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                                              Ş
                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                    8
                                                                                                                                                                                                                                                                                                                                                                                                        뮍
                                                                                                                                                                                                                                                                                                                                                                                                                         Š
                                                                                                                                                                                                                                                                                                                                                                                                                                             片
                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       δõ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            뮹
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            δÃ
                                                                                                                                      맑
                                                                                                                                                   8
                                                                                                                                                                          멍
                                                                                                                                                                                          Š
                                                                                                                                                                                                              В
                                                                                                               Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Query Match
Best Local
                                                  ABB07693
                                                                                                                                                                                                                                                     475
                                                                                                                                                                                                                                                                                          415
                                                                                                                                                                                                                                                                                                             420
                                                                                                                                                                                                                                                                                                                                355
                                                                                                                                                                                                                                                                                                                                                 361
                                                                                                                                                                                                                                                                                                                                                                     295
                                                                                                                                                                                                                                                                                                                                                                                       301
                                                                                                                                                                                                                                                                                                                                                                                                          235
                                                                                                                                                                                                                                                                                                                                                                                                                           241
                                                                                                                                                                                                                                                                                                                                                                                                                                              175
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   115
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     121
                                                                                                                                                                                                                 535
                                                                                                                                                                                                                                   540
                                                                                                                                                                                                                                                                       480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                181
                                                                                                                   716
                                                                                                                                      652
                                                                                                                                                         959
                                                                                                                                                                            595
                                                                                                 712 LKMLA 716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         55
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          61
```

```
Matches 522; Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Expression is regulated by maintaining the temperature at at least 40 deg. C to suppress expression. Pal is produced in high concentrations. See also EP-279664: regualtion by sugar component as C source at 0.3% o more. (Updated on 25-MAR-2003 to correct PR field.) (Updated on 25-MAR-2003 to correct PR field.)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Sequence 716 AA;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1 MAPSIDSIATTLANGETNGSHAAPTKSAAGPTSALRRTPGIDGHAAHQSQIEIVQEIISD 60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Similarity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        VKMLA 720
                                       SPALSYLSPRIQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNVL
                                                                                                                                                                                                                                                            VDLRAMELDFKKQFDFLLFTLLQQHLG---TGLDV-NALALEVKKALNKRLEQTTTYDLE
                                                                                                                                                                                                                                                                                                        AAYTSELGHLANPVTTHVQPAEMANQAVNSLALISARRTTESNDVLSLLLATHLYCVLQA
                                                                                                                                                                                                                                                                                                                                                                                                                              ASAVSISMEKTRLALALIGKLNETQCTBLLNAAMNRGLPSCLAAEDPSLNYHGKGLDIHI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          EGILRQDRYPLRTSPQFLGPLVEDMMHAYSTLSLE-NNTTTDNPLLDVENKQTAHGGNFQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      SLTAMTVEAMVGHAGSFHEFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  ALTALTVEAMVGQQGSFAPFIHDVCRÞHÞGQVEVARNIRTLLSGSSFAVBHEEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              VVHEGKEKILYAREAMALFNLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      SLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAISGHPDSKVH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             SUTRGHSAVRLVVLEAUTNFLNHRITPIVPLRGSISASGDLSPLSYIAGAITGHPDVKVH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GFGGSADTRTEDAISLQKALLEHQLCGVLPSSFDSFRLGRGLENSLPLEVVRGAMTIRVN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            GFGGSADTRTEDAVSLOKALIEHQLCGVTFTSXSSFSVGRGLENTLPLEVVRGAMVIRVN 180
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               PTDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVTT 114
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         PTDDVVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSVYGVTT 120
                                                                   AAYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQA
                                                                                                                                                                                                                                                                                                                                                                                                AAAVANTMEKTRLGLAQIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   EGILRQDRYPLRTSPQWLGPLVSDL114AVAVITIEAGQSTTDND1IDVENKTSHHGGNFQ
                                                                                                                                                                                                                    IDLRAIBFEFKKÓFGÞAIVSLIDOHFGSAMTGSNLRDELVEKVNKTLAKRLEÓTNSYÐLV
                                                                                                                               PRWHDAFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAISLTREVRNRFWQTPSSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               72.4%;
72.0%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        ; Score 2614; DB 1;
; Pred. No. 1.7e-219;
86; Mismatches 103;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Length 716;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               14;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   9 8
                                                                                                                                                                                                                              594
                                                                                                                                                                                                                                                                                                                                                                                                                                                   479
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      419
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       294
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                174
                                                                                                                                                                                                                                                                     595
                                                                                                                                                                                                                                                                                                                 534
                                                                                                                                                                                                                                                                                                                                                           539
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            414
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               354
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        234
                                                                                                                                      651
                                                                                                                                                                                  655
                                                                                                                                                                                                                                                                                                                                                                                                         474
```

```
07-AUG-2003
10-JUN-2002
                                              standard;
 (revised)
(first entry)
                                               protein;
                                                 716
```

```
뮍
                                                     5
                                                                                            Дb
                                                                                                                                 λõ
                                                                                                                                                                                gd
                                                                                                                                                                                                               δ
                                                                                                                                                                                                                                                          В
                                                                                                                                                                                                                                                                                           Ş
                                                                                                                                                                                                                                                                                                                                9
                                                                                                                                                                                                                                                                                                                                                                    Š
                                                                                                                                                                                                                                                                                                                                                                                                                  g
                                                                                                                                                                                                                                                                                                                                                                                                                                              Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Query Match
Best Local S
Matches 522
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       The invention relates to an isolated and purified yeast phenylalanine ammonia lyase (PAL) polypeptide. The PAL encoding polynucleotide or a host cell comprising the polynucleotide is useful for the production of I-PAL, by adding the polynucleotide or the host cell to a composition comprising trans-cinnamic acid, or trans-cinnamate and ammonia; and for improving the production of PAL, its analog or another optically active unnatural amino acid having PAL-like structure. The PAL polynucleotides are useful for treating a mammal having a disease, disorder or condition selected from phenylketonuria, cancer, human immunodeficiency virus infection and human cytomegalovirus infection. The present sequence represents a R. toruloides PAL polypeptide. (Updated on 07-AUG-2003 to
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Phenylalanine ammonia lyase polypeptide and polynucleotide useful for treating mammal having disease or disorder from phenylketonuria, cancomman immunodeficiency virus infection and human cytomegalovirus
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Sequence
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            represents a R. toruloides PAL polypeptide.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Local 522;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Example 3;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Yoshida RK,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          PAL; yeast; cytostatic;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        (PCBU-)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             24-JUL-2000;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    24-JUL-2001;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Rhodosporidium toruloides
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 R. toruloides
                          295
                                                               301
                                                                                                    235
                                                                                                                                                                                  175
                                                                                                                                                                                                                                                              115
                                                                                                                                         241
                                                                                                                                                                                                                     181
                                                                                                                                                                                                                                                                                                   121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          2002-268973/31.
                                                                                                                                                                                                                                                                                                                                      5
                                                                                                                                                                                                                                                                                                                                                                           61
                                                                                                                                                                                                                                                                                                                                                                                                                    ۲
                                                                                                                                                                                                                                                                                                                                                                                                                                                           μ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Similarity
                                                       ALTALTYEAMYGQQGSFAPFIHDYCRPHPGQVEVARNIRTLLSGSSFAVEHEEEVKVKDD
                                                                                                                      VLHEGTEKIMFAREAISLFGLEAVVLGPKEGLGLVNGTAVSASMATLSLHDSHMLSLLSQ
                                                                                                                                                                          SUTRGHSAVRLVVLEALTNFLNHGITFIVPLRGTISASGDLSPLSYIAAAISGHPDSKVH
                                                                                                                                                                                                       SLTRGHSAVRLVVLEALTNFLNHRITPIVPLRGSISASGDLSPLSYIAGAITGHDDVXVH
                                                                                                                                                                                                                                                                                       GFGGSADTRTEDAVSLQKALIEHQLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIRVN
                                                                                                                                                                                                                                                                                                                                                        PTDDVVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSVYGVTT
                                                                                                                                                                                                                                                                                                                                                                                                           MAPSLDSISHSFANG-----VASAKQAVNGASTNLAVAGSHLPTTQVTQVDIVEKMLAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                MAPSLDSLATTLANGFTNGSHAAPTKSAAGPTSALRRTPGLDGHAAHQSQLEIVQELLSD
                                                                                                                                                                                                                                                        GFGGSADTRTEDATSLOKALLEHOLCGVLPSSFDSFRLGRGLENSLPLEVVRGAMTIRVN
                                                                                                                                                                                                                                                                                                                                    PTDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            716 AA;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Fig
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    phenylalanine ammonia lyase; cinnamic acid; enzyme;
anti-HIV; virucide; nootropic; dermatological; gene
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      SERVICES
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             2000US-00624693
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  2001WO-US023270
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Kootstra
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             PAL polypeptide
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1; 135pp; English.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                72.4%;
72.0%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      INC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           86;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Score 2614; DB 5;
Pred. No. 1.7e-219;
6; Mismatches 103;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                716;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         14;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    gene therapy
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            cancer,
                                                           360
                                                                                                                                                                                                                                                                                             180
                                                                                                                                                                                                                                                                                                                                                                                                                                                     60
                                                                                                  294
                                                                                                                                                                              234
                                                                                                                                                                                                                 240
                                                                                                                                                                                                                                                        174
                                                                                                                                                                                                                                                                                                                                  114
                                                                                                                                                                                                                                                                                                                                                                                                              54
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ເກ
~•
RESULT 9
AAE27941
ID
AAE27941
AC
XX
AAE2
XX
AAE2
XX
AAE2
XX
AAE2
XX
DT 06-A
DT 27-D
XX
Canc
KW Yeas
KW canc
KW huma
XX
US20
XX
US20
XX
VS20
AX
XX
PD 01-A
PR 24-J
PR 2
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     S
                                                                                                                                                                                                                                                                                             Yoshida
```

```
712
                                             652
                                                                     959
                                                                                              595
                                                                                                                   596
                                                                                                                                             535
                                                                                                                                                                    540
                                                                                                                                                                                           475
                                                                                                                                                                                                                   480
                      716 VKMLA
                                                                                                                                                                                                                                          415
                                                                                                                                                                                                                                                                  420
                                                                                                                                                                                                                                                                                         355
                                                                                                                                                                                                                                                                                                                361
                                           VDLRAMELDFKKQFDFLLFTLLQQHLG---TGLDV-NALALEVKKALNKRLEQTTTYDLE
LKMLA
                                                                                          PRWHDAFSFAAGTVVEVLSST---SLSLAAVNAWKVAAAESAISLTRQVRETFWSAASTS
                                                                                                                                                                                                      AAYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQA 539
                                                                                                                                                                                                                                      AAAVANTMEKTRIGLAQIGKLNFTQITEMINAGMNRGIPSCLAAEDPSLSYHCKGIDIAA 474
                                                                                                                 PRWHDAFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAISLTREVRNREWQTPSSQ
                                                                                                                                                                                                                                                                                    AAYTSELGHLANPVTTHVQPAEMANQAVNSLALISARRTTESNDVLSLLLATHLYCVLQA
                                                                                                                                                                                                                                                             ASAVSISMEKTRLALALIGKLNFTQCTELLNAAMNRGLPSCLAAEDPSLNYHGKGLDIHI 479
716
                                                                   715
                                                                                           651
                                                                                                                  9
                                                                                                                                                                 595
                                                                                                                                          594
                                                                                                                                                                                        534
                                                                                                                                                                                                                                                                                      414
```

AAE27941 standard; protein; 716 8

AAE27941;

06-AUG-2003 27-DEC-2002 (revised)
(first entry)

Rhodotorula toruloides PAL protein

Yeast; phenylalanine ammonia lyase; PAL; EC 4.3.1.5; phenylketonuria; cancer; human immunodeficiency virus infection; HIV; gene therapy; hCMV; human cytomegalovirus infection; cytostatic; virucide.

Rhodosporidium toruloides.

US2002102712

01-AUG-2002

24-AUG-2001; 2001US-00939408

24-JUL-2000; 24-JUL-2001; 2000US-00624693. 2001WO-US023270.

(PCBU-) PCBU SERVICES INC

2002-690616/74.

RK,

Kootstra

Æ

N-PSDB; AAD45815.

Novel isolated and purified Rhodotorula phenylalanine ammonia lyase polypeptide, useful for treating a mammal having phenylketonuria, cancer, human immunodeficiency virus or human cytomegalovirus infection.

Example 3; Page 43-45; 74pp; English

The present invention relates to yeast (e.g. Rhodotorula) phenylalanin ammonia lyase (PAL; EC 4.3.1.5) proteins and polynucleotides encoding such proteins. PAL sequences are useful for producing L-phenylalanine. They are useful for treating mammals having diseases, disorders or conditions that would benefit from treatment with PAL proteins such as phenylalanine

```
SSSSSS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Db
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              밁
AAE20653
ID AAE:
XX
AC AAE:
XX
DT 01-
                                                                                                                                                                                                                                                                                                                                                                                                                                  뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                              δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               멍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             g
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ğ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      밁
                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                 Ş
                                                                                                                                                                                                                                                                    Ş
                                                                                                                                                                                                                                                                                                                                   8
                                                                                                                                                                                                        S
                                                                                                                                                                                                                                           В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Query Match
Best Local
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    phenylketonuria, cancer, human immunodeficiency virus infection (HIV) chuman cytomegalovirus (hCMV) infection. Sequences of the invention are also used in gene therapy. The present sequence is R. toruloides PAL protein. (Updated on 06-AUG-2003 to correct OS field.)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Sequence
 Rhodotorula glutinis phenylalanine
                                   01-JUL-2002
                                                                                                AAE20653 standard;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Local 522;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        175
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      181
                                                                                                                                                                                                                                                                                                          595
                                                                                                                                                                                                                                                                                                                                        596
                                                                                                                                                                                                                                                                                                                                                                                                                                    475
                                                                                                                                                                                                                                                                                                                                                                                                                                                                  480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               355
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             295
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           235
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          241
                                                                                                                                                                               712
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  55
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Similarity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            MAPSIDSLATTLANGFTNGSHAAPTKSAAGPTSALRRTPGIDGHAAHQSQIEIVQEILISD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             PTDDVVBLSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSVYGVTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                MAPSIDSISHSFANG-----VASAKQAVNGASTNLAVAGSHLPTTQVTQVDIVEKMLAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  VLHEGTEKIMFAREAISLFGLEAVVLGPKEGLGLVNGTAVSASMATLSLHDSHMLSLLSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              SLTRGHSAVRLVVLEALTNFLNHRITPIVPLRGSISASGDLSPLSYIAGAITGHPDVKVH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GFGGSADTRTEDAVSLQKALIEHQLCGVTFTSXSSFSVGRGLENTLFLEVVRGAMVIRVN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                PTDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVTT
                                                                                                                                                                                                                                                                     APAHAYLSPRTRVLYSFVREELGVQARRGDVFVGVQQETIGSNVSRIYEAIKDGRINHVL
                                                                                                                                                                                                                                                                                                                                                                                                                                                              AAYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          EGILRODRYPLRISPOFIGPLVEDMMHAYSTLSLE-NNTTTDNPLLDVENKQTAHGGNFQ 419
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               SLTAMTVEAMVGHAGSFHPFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            VVHEGKEKILYAREAMALENLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        SLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAISGHPDSKVH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    GFGGSADTRTEDAISLOKALLEHOLCGVLPSSFDSFRLGRGLENSLPLEVVRGAMTIRVN
                                                                                                                                                                                                              VKMLA
                                                                                                                                                                                                                                            SPALSYLSPRTQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNVL
                                                                                                                                                                                                                                                                                                          PRWHDAFSFAAGTVVEVLSST---SLSLAAVNAWKVAAAESAISLTRQVRETFWSAASTS
                                                                                                                                                                                                                                                                                                                                        PRWHDAFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAISLTREVRNRFWQTPSSQ
                                                                                                                                                                                                                                                                                                                                                                      IDLRAIEFEFKKOFGPAIVSLIDOHFGSAMTGSNLRDELVEKVNKTLAKRLEOTNSYDLV
                                                                                                                                                                                                                                                                                                                                                                                                  VDLRAMELDFKKQFDPLLPTLLQQHLG---TGLDV-NALALEVKKALNKRLEQTTTYDLE 595
                                                                                                                                                                                                                                                                                                                                                                                                                                    AAYTSELGHLANPVTTHVQPAEMANQAVNSLALISARRTTESNDVLSLLLATHLYCVLQA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 AAAVANTMEKTRLGLAQIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIAA 474
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               ASAVSISMEKTRLALIALIGKLNFTQCTELLNAAMNRGLPSCLAAEDPSLNYHGKGLDIHI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               EGILRODRYPLRTSPOWLGPLVSDLIHAHAVLTIEAGOSTTDNPLIDVENKTSHHGGNFO
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           AA
                                   (first
                                                                                                                                                                                                              720
                                                                                                                                                                               716
                                                                                                protein;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            72.4%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          ; Score 2614; DB 5;
; Pred. No. 1.7e-219;
86; Mismatches 103;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            2614; DB 5;
No. 1.7e-219;
        ammonia lyase
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 14;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         174
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         180
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   54
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     120
                                                                                                                                                                                                                                                                                                                                                                                                                                         534
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    414
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             234
                                                                                                                                                                                                                                                   711
                                                                                                                                                                                                                                                                                                             651
                                                                                                                                                                                                                                                                                                                                           655
                                                                                                                                                                                                                                                                                                                                                                                                                                                                     539
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  354
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              294
```

```
Para-hydroxycinnamic acid; PHCA; food packaging; electronic connector; phenylalanine ammonia lyase; PAL; gliccose; tyrosine ammonia lyase; TAL; cytochrome p-450; cytochrome p-450 reductase; liquid crystal polymer; LCP; telecommunication; medical device; aerospace application; enzyme;
```

Rhodotorula glutinis

23-JAN-2001; 2001WO-US002099

27-JUL-2000; 2000US-00627216

(DUPO ) DU PONT DE NEMOURS & CO Ħ

AA, Sariaslani FS, Tang × ဝ ΨW. Vannelli

WPI; 2002-280635/32. N-PSDB; AAD33075.

Novel nucleic acid encoding truncated mutant tyrosine ammonia lyase polypeptide, or mutant TAL polypeptide, useful for producing parahydroxycinnamic acid in recombinant host cell lacking cinnamate (TAL)

Example 6; Page 92-95; 139pp; English

The invention relates to methods for biological production of paracchy hydroxycinnamic acid (PHCA). The invention relates to developing of a new biocatalyst for conversion of glucose to PHCA by incorporation of the wild type phenylalanine ammonia lyase (PAL; EC 4.3.1.5) from the yeast Rhodotcrula glutinis into Escherichia coli underlying the ability of the wildtype PAL to convert tyrosine to PHCA. The invention is also directed to developing a new biocatalyst for conversion of glucose to PHCA by comporation of the wildtype PAL which possesses enhanced tyrosine commonia lyase (TAL) activity from the yeast Rhodotcrula glutinis plus the Clarific conversion of glucose to PHCA by commonia lyase (TAL) activity from the yeast Rhodotcrula glutinis plus the CR acid encoding mutant TAL enzyme is useful for producing PHCA by recombinant techniques. The recombinantly produced PHCA may be used as a CR recombinant production of liquid crystal polymers (LCP). LCP may be used as a CR recombinant production of liquid crystal polymers (LCP). LCP may be used these materials to be used in medical devices as well as chemical, and conversions applications. The present sequence is Rhodotcrula glutinis protein

Sequence 716 AA;

```
片
                                                                                                             Ş
                                                                                                                                           밁
                                                                                                                                                                   Š
                                                                                                                                                                                                   밁
                                                                                                                                                                                                                            Õ
                           B
                                                      Ş
                                                                                                                                                                                                                                                         Query Match
Best Local Simi
Matches 522;
 241
                                                                                                                121
                                                                                                                                             55
                                                                                                                                                                        61
                                                                                                                                                                                                   Ъ
                                                                                                                                                                                                                                                                         Similarity
                                                                                                                                                                                                                              MAPSIDSLATTLANGETNGSHAAPTKSAAGPTSALRRTPGLDGHAAHQSQLEIVQELLSD
                                                                                     GFGGSADTRTEDAISLQKALLEHQLCGVLPSSFDSFRLGRGLENSLPLEVVRGAMTIRVN
                                                                                                         GFGGSADTRTEDAVSLQKALIEHQLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIRVN
                                                                                                                                             PTDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVTT
                                                                                                                                                               PTDDVVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSVYGVTT
VLHEGTEKIMFARBAISLFGLEAVVLGPKEGLGLVNGTAVSASMATLSLHDSHMLSLLSQ
                                                 SLTRGHSAVRLVVLEALTNFLNHRITDIVPLRGSISASGDLSPLSYIAGAITGHPDVXVH
                                                                                                                                                                                                    MAPSIDSISHSFANG-----VASAKQAVNGASTNLAVAGSHLPTTQVTQVDIVEKMLAA
                                                                                                                                                                                                                                                          Conservative
                                                                                                                                                                                                                                                                        72.4%;
                                                                                                                                                                                                                                                             86;
                                                                                                                                                                                                                                                          Score 2614; DB 5;
Pred. No. 1.7e-219;
6; Mismatches 103;
                                                                                                                                                                                                                                                                                       Length 716;
                                                                                                                                                                                                                                                               Indels
                                                                                                                                                                                                                                                               14;
                                                                                                                                                                                                                                                               Gaps
                                                                                           174
                                                                                                                      180
                                                                                                                                                 114
                                                                                                                                                                              120
                                                                                                                                                                                                          ت
4
                                  234
```

```
RESULT 11
AAE16389
ID AAE16
XX AAE16
XX AAE16
XX Pheny
KW Pheny
KW Pheny
KW Dara-
KW Liqui
KW AE206
XX Rhodc
XX Pheny
KW O3-AF
XX WO200
XX WO200
XX IS-FH
XX O5-AF
XX IS-FH
XX
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      8
8
8
8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     8 8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       유 왕 문
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           밁
                            Producing para-hydroxycinnamic acid for producing liquid crystal polymer, comprises converting cinnamate to PHCA, glucose to PHCA by phenyl ammonia-lyase route, or generating a biocatalyst with tyrosine ammonia-lyase
                                                                                                                                                                                                                                                                    06-AUG-1999;
                                                                                                                                                                                                                                                                                                         03-AUG-2000; 2000WO-US021156
                                                                                                                                                                                                                                                                                                                                                                                                                                 Rhodotorula
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Phenylalanine ammonia-lyase; PAL; enzyme; cinnamate; food packing; PHCA para-hydroxycinnamic acid; tyrosine ammonia-lyase; TAL; medical device; Liquid Crystal Polymer; LCP; electronic connector; telecommunication;
                                                                                                                                                                                                                                                                                                                                                     15-FEB-2001
                                                                                                                                                                                                                                                                                                                                                                                          WO200111071-A2
                                                                                                                                                                                                                                                                                                                                                                                                                                                                          aerospace application;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        09-APR-2002
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      AAE16389
                                                                                                                       2002-121549/16
DB; AAD26923.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          712
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          652
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 656
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  596
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           535
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         475
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        415
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          355
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           235
                                                                                                                                                                                                                           D
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               standard; protein; 716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            LEMLA 716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  SPALSYLSPRTQILYAFVRBELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNVL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            APAHAYLSPRTRVLYSFVREELGVQARRGDVFVGVQQETIGSNVSRIYEAIKDGRINHVL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          VDLRAMELDEKKOFDPLLPTLLOOHLG---TGLDV-NALALEVKKALNKRLEOTTTVDLE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 VKMLA 720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          PRWHDAFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAISLTREVRNRFWQTDSSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   AAYTSELGHLANPVTTHVQPAEWANQAVNSLALISARRTTESNDVLSLLLATHLYCVLQA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             AAYASELGHLANPYTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 AAAVANTMEKTRLGLAQIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         ASAVSISMEKTRIALALIGKINFTQCTELLNAAMNRGLPSCLAAEDPSLNYHGKGLDIHI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        ALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEBEVKVKDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               BGILRODRYFLRTSPQWLGFLVSDLTHAHAVLTIEAGQSTTDNPLIDVENKTSHHGGNFQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  EGILRODRYPLRTSPOFLGFLVEDMMHAYSTLSLE-NNTTTDNPLLDVENKQTAHGGNFQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              SITAMTVEAMVGHAGSFHPFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEVKVXDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   VVHEGKEXILYAREAMALFNLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     IDLRATEFEFKKÖFGPATVSLIDÖHFĞSAMTĞSNLRDELVEKVNKTLAKRLEÖTNSYDLV
                                                                                                                                                                                                                         PONT DE NEMOURS & CO
                                                                                                                                                                                                                                                                                                                                                                                                                                 glutinis
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        glutinis wildtype phenylalanine ammonia-lyase (PAL)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   (first entry)
                                                                                                                                                                                                                                                                  99US-0147719P
                                                                                                                                                                                    Ĭ,
                                                                                                                                                                                  <u>۾</u>
                                                                                                                                                                                                                                                                                                                                                                                                                                                                        chemical;
                                                                                                                                                                                  W.W
                                                                                                                                                                                Sariaslani
                                                                                                                                                                                                                         [F]
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    SLSLAAVNAWKVAAAESAISLTRQVRETFWSAASTS
                                                                                                                                                                                Ś
                                                                                                                                                                                Gatenby
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           715
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    459
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              655
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  594
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     534
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          479
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          539
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   474
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  414
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           419
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    354
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   294
               밁
                                                                                                                                Ş
                                             δÃ
                                                                                           밁
                                                                                                                                                                         멍
                                                                                                                                                                                                          Š
                                                                                                                                                                                                                                                   당
                                                                                                                                                                                                                                                                                                                                                                        8
                                                                                                                                                                                                                                                                                        Ś
                                                                                                                                                                                                                                                                                                                                        멍
                                                                                                                                                                                                                                                                                                                                                                                                                      B
                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          8X2020202020X8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Matches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Query Match
Best Local Similarity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      The invention relates to a method for producing para-hydroxycinnamic acid (PHCA). The method comprises converting cinnamate to PHCA by converting glucose to phenylalanine to PHCA through the phenyl ammonia-lyase (PAL) route or by generating a new biocatalyst possessing enhanced tyrosine ammonia-lyase (TAL) activity. The method is useful for the biological production of PHCA which is useful as a monomer for the production of Liquid Crystal Polymers (LCP), where the LCP is used in electronic connectors, telecommunications and aerospace applications. LCP is also useful in medical devices, as well as chemical, and food packing applications due to its resistance to sterilising radiation. The present sequence is red yeast, Rhodotorula glutinis (Rhodosporidium toruloides) wildtype PAL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Sequence
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Claim
             712
                                                                                           652
                                                                                                                                    656
                                                                                                                                                                           595
                                                                                                                                                                                                                                                            535
                                                                                                                                                                                                                                                                                                   540
                                                                                                                                                                                                                                                                                                                                          475
                                                    716 VKMLA
                                                                                                                                                                                                                  596
                                                                                                                                                                                                                                                                                                                                                                               480
                                                                                                                                                                                                                                                                                                                                                                                                                          415
                                                                                                                                                                                                                                                                                                                                                                                                                                                               420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         355
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         295
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          235
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          175
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      115
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       522;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ភូ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         ب
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1 MAPSIDSLATTLANGFTNGSHAAPTKSAAGPTSALRRTPGIDGHAAHQSQLEIVQELLSD
                                                                                      SPALSYLSPRIQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNVL
                                                                                                                 APAHAYLSPRTRVLYSFVREELGVQARRGDVFVGVQQETIGSNVSRIYEAIKDGRINHVL
                                                                                                                                                                       PRWHDAFSFAAGTVVEVLSST---SLSLAAVNAWKVAAAESAISLTRQVRETFWSAASTS
                                                                                                                                                                                                        PRWHDAFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAISLTREVRNRFWQTPSSQ
                                                                                                                                                                                                                                                   IDLRAIBFEFKKQFGPAIVSLIDQHFGSAMTGSNLRDELVEKVNKTLAKRLEQTNGYDLV
                                                                                                                                                                                                                                                                                        VDLRAMELDFKKQFDFLLFTLLQQHLG---TGLDV-NALALEVKKALNKRLEQTTTYDLE
                                                                                                                                                                                                                                                                                                                                      AAYTSELGHLANPVITHVQPAEMANQAVNSLALISARRTTESNDVLSLLLATHLYCVLQA
                                                                                                                                                                                                                                                                                                                                                                AAYASELGHLANPUTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQA
                                                                                                                                                                                                                                                                                                                                                                                                                                                       ASAVSISMEKTRLALIGKLNFTQCTELLNAAMNRGLPSCLAAEDPSLNYHGKGLDIHI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  EGILRODRYPLRTSPOWLGELVSDLIHAHAVLTIEAGOSTTDNFLIDVENKTSHHGGNFO
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              EGILRQDRYPLRTSPQFLGPLVEDMMHAYSTLSLE-NNTTTDNPLLDVENKQTAHGGNFQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHBEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                                                                                    AAAVANTMEKTRLGLAQIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     SLTAMTVEAMVGHAGSFHPFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 VVHEGKEKILYAREAMALFNLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               SUTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAISGHPDSKVH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           SLTRGHSAVRLVVLEALTNFLNHRITPIVPLRGSISASGDLSPLSYIAGAITGHPDVKVH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            GFGGSADTRTEDAVSLQKALIEHQLCGVTPTSXSSFSVGRGLENTLFLEVVRGAMVIRVN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Page
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    GFGGSADTRTEDATSLOKALLEHOLCGVLPSSFDSFRLGRGLENSLPLEVVRGAMTIRVN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            PTDDVVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSVYGVTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     MAPSIDSISHSFANG-----VASAKQAVNGASTNLAVAGSHLPTTQVTQVDIVEKNLAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          716 AA;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    PTDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Conservative
                                                    720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    65-67;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   72.4%; Score 2614; DB 5; 72.0%; Pred. No. 1.7e-219; tive 86; Mismatches 103;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                75pp;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                English
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     14;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Gaps
```

234 240 180 114

354 360 294 υ 4.

υı

715 651 655

595 534 474 479 414 419

```
RESULT 12
ABG71948
                                                                                                                                                                                                                                                                                                                                                            The invention relates to a recombinant host comprising at least one gene cc encoding a tyrosine ammonium lyase (PAL) activity, and at least one gene cc encoding a phenylalanine hydroxylase (PAH) activity. Also included are: (1) a method for producing para-hydroxycinnamic acid involving: (1) growiding the recombinant host; and (2) growing the recombinant organism cc in the presence of a fermentable carbon substrate and thus producing para hydroxycinnamic acid; (2) method for producing tyrosine involving: (1) growiding a recombinant organism comprising at least one gene encoding a phenylalanine hydroxylase activity, and (2) growing the recombinant crompanism in the presence of a fermentable carbon substrate to produce tyrosine. The recombinant host cell is used for producing paraccycinnamic acid and tyrosine. Increasing the carbon flow into the production of para-hydroxycinnamic acid (PHCA) which is useful as a cc gouence for the production of liquid crystal polymer. The present cc enzyme which catalyses the conversion of phenylalanine into cinnamic acid enzyme which catalyses the conversion of phenylalanine into cinnamic acid enzyme which catalyses the conversion of phenylalanine into cinnamic acid enzyme which catalyses the conversion of phenylalanine into cinnamic acid
                          5
                                                                            В
                                                                                                                 Ş
                                                                                                                                                              뮍
                                                                                                                                                                                                                                           Query Match
Best Local Sim:
Matches 522;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Enzyme; phenylalanine ammonia-lyase; PAL; phenylalanine hydroxylase; PAH; para-hydroxycinnamic acid; tyrosine ammonium lyase; TAL; tyrosine; cinnamic acid; PHCA; liquid crystal polymer.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Novel recombinant host for producing para-hydroxycinnamic tyrosine, comprises gene encoding tyrosine ammonium lyase gene encoding phenylalanine hydroxylase activity.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Qi WW,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               04-MAY-2001; 2001US-0288701P
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         03-MAY-2002; 2002WO-US018551
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Rhodtorula glutinis.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    R. glutinis wild-type Phenylalanine ammonia-lyase, PAL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               27-JAN-2003 (first entry)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              ABG71948 standard; protein; 716 AA.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Claim 5; Page 48-50; 69pp; English.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          WPI; 2003-058928/05
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        (DUPO )
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       WO200290523-A2
                                                                                                                                                                                                                                                                                                                               Sequence 716 AA;
                                       121
                                                                                                                     61
                                                                                                                                                                                               1 MAPSLDSLATTLANGFTNGSHAAPTKSAAGPTSALRRTPGLDGHAAHQSQLEIVQELLSD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      DU PONT DE NEMOURS & CO E
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Sariaslani FS,
                                                                                                                                                                                                                                                                     Similarity
                     | GFGGSADTRTEDAVSLQKALIEHQLCGVTFTSXSSFSVGRGLENTLPLEVVRGAMVIRVN 180
GFGGSADTRTEDAISLOKALLEHQLCGVLPSSFDSFRLGRGLENSLPLEVVRGAMTIRVN
                                                                                                            PTDDVVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDXSVDFLKAQLQNSVYGVTT
                                                                                  PTDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVTT
                                                                                                                                                              MAPSIDSISHSFANG-----VASAKQAVNGASTNLAVAGSHLPTTQVTQVDIVEKMLAA
                                                                                                                                                                                                                                             Conservative
                                                                                                                                                                                                                                             72.4%; Score 2614; DB 6; Length 716; 72.0%; Pred. No. 1.7e-219; 21ve 86; Mismatches 103; Indels 1.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Tang
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           acid and activity
                                                                                                                                                                                                                                                   14;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              and
                                                                                    114
                                                                                                                              120
                                                                                                                                                                   5
4
      174
```

```
RESULT 13
ADE36054
ID ADE36
                                                                                                                                                                                                                                                                                                                                                                                                                                          Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               뭕
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Š
  S
                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                  Rhodosporidium.
                                                                                                                                                                                                                       altered property; combined gene.
                                                                                                                                                                                                                                                     Rhodosporidium glutinis PAL protein SEQ ID NO:2.
                                                                                                                                                                                                                                                                              29-JAN-2004 (first entry)
                                                                                                                                                                                                                                                                                                                         ADE36054 standard; protein; 716
                                                                                                                                                         04-SEP-2003
                                                                                                                                                                              WO2003072743-A2
Recombination of nucleic acid templates, useful e.g. for producing enzymes with altered properties, is based on cyclic extension of \mathbf{u}
                                 WPI; 2003-721766/68.
N-PSDB; ADE36053.
                                                                  Milano J,
                                                                                                                                                                                                                                  recombination; nucleic acid template; recombined polypeptide;
                                                                                                            26-FEB-2002; 2002US-0360279P
                                                                                                                                26-FEB-2003; 2003WO-US005708
                                                                                        OUPO ) DU
                                                                                                                                                                                                                                                                                                                                                                                                                                                                     595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            475
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      415
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 355
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           295
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       235
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      181
                                                                                                                                                                                                                                                                                                                                                                                                                                               656
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           596
                                                                                                                                                                                                                                                                                                                                                                                712
                                                                                                                                                                                                                                                                                                                                                                                                                           652
                                                                                                                                                                                                                                                                                                                                                                                                     716 VKMLA 720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               SLTRGHSAVRLVVLBALTNFLNHRITÞIVÞLRGSISASGDLSÞLSYIAGAITGHÞDVKVH 240
                                                                                                                                                                                                                                                                                                                                                                                                                         ALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEVKVKDD 360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     VLHEGTEKIMFAREAISLFGLEAVVLGPKEGLGLVNGTAVSASMATLSLLDSHMLSLLSQ 300
                                                                                                                                                                                                                                                                                                                                                                               LKMLA 716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   AAYTSELGHLANPYTTHYQPAEMANQAVNSLALISARRITESNDYLSLLLATHLYCYLQA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       AAYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     AAAVANTMEKTRIGIAQIGKINFTQITEMINAGMNRGIPSCIAAEDPSISYHCKGIDIAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     ASAVSISMEKTRLALALIGKLNFTQCTELLNAAMNRGLPSCLAAEDPSLNYHGKGLDIHI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                EGILRQDRYPLRTSPQFLGPLVEDMMHAYSTLSLE-NNTTTDNPLLDVENKQTAHGGNFQ 419
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          SLTAMTVEAMVGHAGSTHPFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     VVHEGKEKILYAREAMALENLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                     PRWHDAFSFAAGTVVEVLSST---SLSLAAVNAWKVAAAESAISLTRQVRETFWSAASTS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       PRWHDAFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAISLTREVRNRFWQTPSSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 IDLRAIEFEFKKÖFGPAIVSLIDOHFGSAMTGSNLRDELVEKVNKTLAKRLEQTNSYDLV
                                                                  Tang X;
                                                                                       PONT DE NEMOURS & CO
                                                                                           U
       unpaired
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           474
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              655
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               534
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    539
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                479
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     414
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                354
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          294
                                                                                                                                                                                                                                                                                                                                                                                                                                                    715
                                                                                                                                                                                                                                                                                                                                                                                                                                                                          651
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    594
```

```
밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              The present invention describes a method for the recombination of nucleic acid (NA) templates. The method comprises: (a) providing at least two CC double-stranded templates (T1, T2) having different 5' and 3' regions in CC their sense strands; (b) contacting the templates with at least one each CC region of the antisense strand of T1 and to the 3'-region of the sense strands of T2 and to the 3'-region of the sense CC (nt); (d) separating extended primers by no more than 1000 nucleotides (reannealing the extended primers, to either template; and (f) repeating CC cycles of steps (b)-(e) until at least one full-length extension product, i.e. a recombination of T1 and T2, is obtained. Also described: (1) a CC method starting from at least one each of antisense and sense single stranded templates; (2) generating a recombined polypeptide (I) with CC altered properties by expressing recombination products of the new processes and screening the polypeptides formed for properties different C from those of polypeptides from either of the templates; and (3) (I) CC method starting altered properties of the templates; and (2) T1 method sare useful for the recombination of nucleic acid templates of interest, and generation of a recombination of polypeptide having altered properties. The method can be used to make CC combined genes that express proteins e.g. enzymes, cytokines, growth cc e.g. stability, activity or specificity. The present sequence is used in the exemplification of the present invention.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Matches 522;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Query Match
Best Local
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Sequence
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Disclosure;
                                                       540
                                                                                                    475
                                                                                                                                                                                          415
                                                                                                                                                                                                                                     420
                                                                                                                                             480
                                                                                                                                                                                                                                                                                 355
                                                                                                                                                                                                                                                                                                                            36I
                                                                                                                                                                                                                                                                                                                                                                         295
                                                                                                                                                                                                                                                                                                                                                                                                                  301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                  235
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        175
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              115
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ហ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Н
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           ш
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Similarity
IDLRAIEFEFKKOFGPAIVSLIDQHFGSAMTGSNLRDELVEKVNKTLAKRLEQTNSYDLV
                                             VDLRAMELDFKKQFDFLLFTLLQQHLG---TGLDV-NALALEVKKALNKRLEQTTTYDLE
                                                                                                                     AAYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQA
                                                                                                                                                                                                                         ASAVSISMEKTRIALALIGKINFTQCTELLNAAMNRGIPSCLAAEDPSLNYHGKGLDIHI 479
                                                                                                                                                                                                                                                                                                                                                                                               ALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEVKVKDD::|||:||| ||| ||| ||||||||||||
                                                                                             AAYTSELGHLANPVTTHVQPAEMANQAVNSLALISARRTTESNDVLSLLLATHLYCVLQA
                                                                                                                                                                                                                                                                         EGILRODRYPLRTSPOWLGPLVSDLIHAHAVLTIEAGQSTTDNPLIDVENKTSHHGGNFQ
                                                                                                                                                                                                                                                                                                                                                                SLTAMTVEAMVGHAGSFHPFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEVKVKDD
                                                                                                                                                                                   AAAVANTMEKTRIGIAQIGKINFTQITEMINAGMNRGIPSCLAAEDPSISYHCKGIDIAA
                                                                                                                                                                                                                                                                                                             EGILRODRYPLRTSPOFLGPLVEDMMHAYSTLSLE-NNTTTDNPLLDVENKQTAHGGNFQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GFGGSADTRTEDAISLOKALLEHOLCGVLBSSFDSFRLGRGLENSLFLEVVRGAMTIRVN
                                                                                                                                                                                                                                                                                                                                                                                                                                                           VVHEGKEKILYAREAMALFNLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 VLHEGTEKIMFAREAISLFGLEAVVLGPKEGLGLVNGTAVSASMATLSLHDSHMLSLLSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 SLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAISGHPDSKVH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  SLTRGHSAVRLVVLEALTNFLNHRITPIVPLRGSISASGDLSPLSYIAGAITGHPDVKVH 240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GFGGSADTRTEDAVSLQKALIEHQLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIRVN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  PTDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      PTDDVVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSVYGVTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 MAPSIDSLATTLANGFTNGSHAAPTKSAAGPTSALRRTPGLDGHAAHQSQLEIVQELLSD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        MAPSIDSISHSFANG-----VASAKQAVNGASTNLAVAGSHLPTTQVTQVDIVEKMLAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         SEQ ID
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Å,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         NO
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         72.4%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      2; 481pp; English
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   86;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Score 2614; DB 7;
Pred. No. 1.7e-219;
6; Mismatches 103;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Length 716;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   14;
                                                                                                                                                                                   474
                                                                                                                                                                                                                                                                                                                     419
                                                  595
                                                                                             534
                                                                                                                                                                                                                                                                                                                                                                  354
                                                                                                                                                                                                                                                                                                                                                                                                                                                        294
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     180
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                114
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           υ
4
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 <u>ن</u>
```

δ

5 밁 δõ 뮍 Ş В 8 В δ Дb 8 밁 5 В 80 맑 8

The invention relates to methods for biological production of parahydroxycinnamic acid (PHCA). The invention relates to developing of a new biocatalyst for conversion of glucose to PHCA by incorporation of the wild type phenylalanine ammonia lyase (PAL, EC 4.3.1.5) from the yeast Rhodotorula glutinis into Escherichia coli underlying the ability of the wildtype PAL to convert tyrosine to PHCA. The invention is also directed to developing a new biocatalyst for conversion of glucose to PHCA by incorporation of the wildtype PAL which possesses enhanced tyrosine ammonia lyase (TAL) activity from the yeast Rhodotorula glutinis plus the plant cytochrome p-450 and the cytochrome p-450 reductase into E. coli. Nucleic acid encoding mutant TAL enzyme is useful for producing PHCA by recombinant techniques. The recombinantly produced PHCA may be used as a monomer for production of liquid crystal polymers (LCP). LCP may be used

Claim

2

Page 126-128; 139pp; English

```
RESULT 14
AAE20660
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 망
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ś
                                                                                                                                                                                Novel nucleic acid encoding truncated mutant tyrosine ammonia lyase (TAL) polypeptide, or mutant TAL polypeptide, useful for producing parahydroxycinnamic acid in recombinant host cell lacking cinnamate
                                                                                                                                                                                                                                                    Gatemby AA,
                                                                                                                                                                           hydroxylase.
                                                                                                                                                                                                                                                                                                                   23-JAN-2001; 2001WO-US002099
                                                                                                                                                                                                                                                                                                                                         07-FEB-2002
                                                                                                                                                                                                                                                                                                                                                              WC200210407-A1
                                                                                                                                                                                                                                                                                                                                                                                               Misc-difference
                                                                                                                                                                                                                                                                                                                                                                                                                     Misc-difference 198
                                                                                                                                                                                                                                                                                                                                                                                                                                                     Synthetic.
                                                                                                                                                                                                                                                                                                                                                                                                                                                             Rhodotorula glutinis
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  biocatalyst; mutant; variant; mutein.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           phenylalanine ammonia lyase; PAL; glucose; Tyrosine ammonia lyase; TAL; cytochrome p-450; cytochrome p-450 reductase; liquid crystal polymer; LCP; telecommunication; medical device; aerospace application; enzyme;
                                                                                                                                                                                                                                                                        (DUPO ) DU PONT DE NEMOURS & CO E
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Para-hydroxycinnamic acid; PHCA; food packaging; electronic connector;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Rhodotorula glutinis mutant tyrosine ammonia lyase (TAL), RM120-2 #1.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          01-JUL-2002
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    AAE20660 standard; protein; 716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    652
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          712
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    596
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              VKMLA 720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             APAHAYLSPRTRVLYSFVREELGVQARRGDVFVGVQQETIGSNVSRIYEAIKDGRINHVL
:||:||||||::||:||||||:||
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          LKMLA 716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  SPALSYLSPRTQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNVL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           PRWHDAFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAISLTREVRNRFWQTPSSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           PRWHDAFSFAAGTVVEVLSST---SLSLAAVNAWKVAAAESAISLTRQVRETFWSAASTS
                                                                                                                                                                                                                                                    Sariaslani FS,
                                                                                                                                                                                                                                                                                               200008-00627216
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          (first
                                                                                                                                                                                                                                                                                                                                                                                               540
                                                                                                                                                                                                                                                                                                                                                                                  /label= Thr, Ala, Ser, Pro,
                                                                                                                                                                                                                                                                                                                                                                                                                              Location/Qualifiers
                                                                                                                                                                                                                                                                                                                                                                                                       label= Asp, Asn, Glu,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         entry)
                                                                                                                                                                                                                                                  Tang
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    B
                                                                                                                                                                                                                                                  ×
                                                                                                                                                                                                                                                                        Н
                                                                                                                                                                                                                                                  P.
                                                                                                                                                                                                                                                                                                                                                                                                         Gln
                                                                                                                                                                                                                                                   WW,
                                                                                                                                                                                                                                                                                                                                                                                   Gly
                                                                                                                                                                                                                                                   Vannelli
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       715
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             651
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  655
```

```
RESULT 15
ABG71951
ID ABG71
XX
AC ABG71
XX
DT 27-JA
XX
                                                                                                                                                                                                                                                                                                                Š
                                                                                                                                                                                                                                                                                                                                                                            S
                                                                                                                                                                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                                                                                                                                           S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ś
                                                                                                                                                                                 Ś
                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                   S
                                                                                                                                                                                                                                                                                  ğ
                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        B,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              8888888
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     뭐
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Query Match
Best Local S
Matches 522
                  27-JAN-2003
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Sequence 716 AA;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       in electronic connectors and telecommunication and aerospace applications. LCP resistance to sterilising radiation has also enabled these materials to be used in medical devices as well as chemical, and food packaging applications. The present sequence is Rhodotorula glutinis
                                                                             ABG71951
                                                                                                                                                                                                                                                                                    595
                                                                                                                                                                                                                                                                                                                   596
                                                                                                                                                                                                                                                                                                                                                   535
                                                                                                                                                                                                                                                                                                                                                                                 540
                                                                                                                                                                                                                                                                                                                                                                                                              475
                                                                                                                                                                                                                                                                                                                                                                                                                                            480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                            415
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     295
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           115
                                                                                                                                                                                                                       652
                                                                                                                                                                                                                                                      656
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   235
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                241
                                                                                                                                                             712
                                                                                                                                                                                       716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  522;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Similarity
                                                                             standard;
                                                                                                                                                                                       VKMLA 720
                                                                                                                                                                                                                                                                               PRWHDAFSFAAGTVVEVLSST---SLSLAAVNAWKVAAABSAISLIRQVRETFWSAASTS
                                                                                                                                                                                                                                                                                                                                                                                                                               AAYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       GFGGSADTRTEDAISLQKALLEHQLCGVLPSSFDSFRLGRGLENSLPLEVVRGAMTIRVN 174
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             GFGGSADTRTEDAVSLQKALIEHQLCGVTFTSXSSFSVGRGLENTLFLEVVRGAMVIRVN 180
                                                                                                                                                           LKMLA
                                                                                                                                                                                                                        SPALSYLSPRIQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNVL
                                                                                                                                                                                                                                         APAHAYLSPRTRVLYSFVREELGVQARRGDVFVGVQQETIGSNVSRIYEAIKDGRINHVL
                                                                                                                                                                                                                                                                                                                PRWHDAFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAISLTREVRNRFWQTPSSQ
                                                                                                                                                                                                                                                                                                                                                 | IDLRAXEFEFKKQFGPAIVSLIDQHFGSAMTGSNLRDELVEKVNKTLAKRLEQTNSYDLV
                                                                                                                                                                                                                                                                                                                                                                            VDLRAMELDEKKQFDPLLPTLLQQHLG---TGLDV-NALALEVKKALNKRLEQTTTYDLE
                                                                                                                                                                                                                                                                                                                                                                                                              AAYTSELGHLANPVTTHVQPAEMANQAVNSLALISARRTTESNDVLSLLLATHLYCVLQA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                          AAAVANTMEKTRIGIAQIGKINFTQITEMINAGMNRGIPSCLAAEDPSISYHCKGIDIAA 474
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      ASAVSISMEKTRLALIGKLNFTQCTELLNAAMNRGLPSCLAAEDPSLNYHGKGLDIHI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         EGILRQDRYPLRTSPQWLGPLVSDLIHAHAVLTIEAGQSTTDNPLIDVENKTSHHGGNFQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  EGILRQDRYPLRTSPQFLGPLVEDMMHAYSTLSLE-NNTTTDNPLLDVENKQTAHGGNFQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     SLTAMTVEAMVGHAGSFHPFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEBVKVKDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  VVHEGKEKILYAREAMALFNLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              VLHEGTEKIMFAREAISLFGLEAVVLGPKEGLGLVNGTAVSASMATLSLHDSHMLSLLSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               SLTRGHSAVRLVVLEALTNFLNHXITPIVPLRGTISASGDLSPLSYIAAAISGHPDSKVH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     SLTRGHSAVRLVVLEALTNFLNHRITPIVPLRGSISASGDLSPLSYIAGAITGHPDVKVH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      PTDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  PTDDVVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSVYGVTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    MAPSIDSISHSFANG-----VASAKQAVNGASTNLAVAGSHLPTTQVTQVDIVEKMLAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 MAPSIDSLATTLANGFTNGSHAAPTKSAAGPTSALRRTPGLDGHAAHQSQLEIVQELISD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Conservative
                  (first entry)
                                                                                                                                                             716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              72.4%;
                                                                             protein;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  85
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Score 2613; DB 5;
Pred. No. 2.1e-219;
5; Mismatches 104;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Indels 14;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                716;
                                                                                                                                                                                                                                                      715
                                                                                                                                                                                                                                                                                    651
                                                                                                                                                                                                                                                                                                                   655
                                                                                                                                                                                                                                                                                                                                                   594
                                                                                                                                                                                                                                                                                                                                                                               595
                                                                                                                                                                                                                                                                                                                                                                                                              534
                                                                                                                                                                                                                                                                                                                                                                                                                                            539
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          479
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         414
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       419
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     354
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  294
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               234
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        114
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    120
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   60
```

```
HARRAN OXEEEEEXAXAXEXEXEXEXEXEXOSOSOSOSOSOSOSOS
                          5
                                                                밁
                                                                                           Š
                                                                                                                                밁
                                                                                                                                                             Ş
                                                                                                                                                                                              망
                                                                                                                                                                                                                                                                                                                                                        The invention relates to a recombinant host comprising at least one gene CC encoding a tyrosine ammonium lyase (TAL) activity, and at least one gene CC encoding a phenylalanine hydroxylase (PAH) activity. Also included are: CC (1) a method for producing para-hydroxycinnamic acid involving: (1) providing the recombinant host; and (2) growing the recombinant organism in the presence of a fermentable carbon substrate and thus producing para CC -hydroxycinnamic acid; (2) method for producing tyrosine involving: (1) providing a recombinant organism comprising at least one gene encoding a phenylalanine hydroxylase activity; and (2) growing the recombinant CC organism in the presence of a fermentable carbon substrate to produce CC tyrosine. The recombinant host cell is used for producing para-hydroxycinnamic acid (PECA) which is useful as a monomer for the production of the R. glutinis Phenylalanine ammonia-lyase, PAL, CC which has TAL activity (PAL/TAL)
                                                                                                                                                                                                                                                                Query Match
Best Local S
Matches 522
                                                                                                                                                                                                                                                                                                                                Sequence 716 AA;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Novel recombinant host for producing para-hydroxycinnamic tyrosine, comprises gene encoding tyrosine ammonium lyase gene encoding phenylalanine hydroxylase activity.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Qi WW,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            04-MAY-2001; 2001US-0288701P
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             03-MAY-2002; 2002WO-US018551
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Misc-difference
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Rhodtorula glutinis
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Enzyme; phenylalanine ammonia-lyase; PAL; phenylalanine hydroxylase; PAH; para-hydroxycinnamic acid; tyrosine ammonium lyase; TAL; PAL/TAL; tyrosine; cinnamic acid; PHCA; liquid crystal polymer; mutant; mutein.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             14-NOV-2002
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              WO200290523-A2
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Misc-difference
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             (DUPO ) DU PONT DE NEMOURS & CO
                                                                                                                                                                                                                                                              Local Sim
hes 522;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        glutinis PAL/TAL mutant
                                                                 115
                                                                                               121
                                181
                                                                                                                                  55
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              5; Page 57-59; 69pp; English.
                                                                                                                                                                 61
                                                                                                                                                                                                Н
                                                                                                                                                                                                                               1 MAPSIDSLATTLANGFTNGSHAAPTKSAAGPTSALRRTPGLDGHAAHQSQLEIVQELLSD
                                                                                                                                                                                                                                                                                Similarity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Sariaslani FS,
SLTRGHSAVRLVVLEALTNFLNHXITFIVPLRGTISASGDLSPLSYIAAAISGHPDSKVH
                    SLTRGHSAVRLVVLEALTNFLNHRITPIVPLRGSISASGDLSPLSYIAGAITGHPDVKVH
                                                                                             GFGGSADTRTEDAVSLQKALIEHQLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIRVN
                                                                                                                                                     PTDDVVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSVYGVTT
                                                                GFGGSADTRTEDAISLQKALLEHQLCGVLPSSFDSFRLGRGLENSLPLEVVRGAMTIRVN
                                                                                                                                   PTDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVTT
                                                                                                                                                                                                  MAPSIDSISHSFANG-----VASAKQAVNGASTNLAVAGSHLPTTQVTQVDIVEKMLAA 54
                                                                                                                                                                                                                                                                Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Location/Qualifiers
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             /label= Thr,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            /label=
                                                                                                                                                                                                                                                                              72.4%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Αsp,
                                                                                                                                                                                                                                                                  85;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         #3
                                                                                                                                                                                                                                                                Score 2613; DB 6;
Pred. No. 2.1e-219;
5; Mismatches 104;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ala, Ser,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Asn,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ħ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Glu,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Pro,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Gln
                                                                                                                                                                                                                                                                                              Length 716;
                                                                                                                                                                                                                                                                  Indels
                                                                                                                                                                                                                                                                14;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              acid and activity
                                                                                                                                                                                                                                                                  Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  and
                                  240
                                                                                                  180
                                                                                                                                   114
                                                                                                                                                                    120
   234
                                                                                                                                                                                                                                                                    ű
```

Search completed: September 9, 2004, 10:04:00 Job time : 92.6307 secs

```
Result
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Title:
Perfect score:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Run
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Post-processing: Minimum Match 0%
Maximum Match 100%
Listing first 45 summaries
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Minimum DB
Maximum DB
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Scoring table:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Sequence:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Database
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Searched:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Total number of
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           protein
     score
and is
                                                                                                                                                                                                                                                                                                                                                                                                                                                          Pred. No.
                                       Score
                                                                                                                                                                                                                                                                                                                                                                                                                                 s
L
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        seq
                                                                                                                                                                                                                                                                                                                                                                                                                                            greater
                                                                                                                                                                                                                                                                                                                                                                                                                                No. is the number of results predicted by chance to have a greater than or equal to the score of the result being printed, derived by analysis of the total score distribution.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         protein search, using
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        length:
length:
                                                                                                                                                                                                                                                                                                                                                                 Query
Match
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                BLOSUM62
Gapop 10.0 ,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   US-09-939-408A-13
3610
                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Issued Patents_AA:*

1: /cgn2_6/ptodata/2/iaa/5A_COMB.pep:*

2: /cgn2_6/ptodata/2/iaa/5B_COMB.pep:*

3: /cgn2_6/ptodata/2/iaa/6A_COMB.pep:*

4: /cgn2_6/ptodata/2/iaa/PCTUS_COMB.pep:*

5: /cgn2_6/ptodata/2/iaa/PCTUS_COMB.pep:*

6: /cgn2_6/ptodata/2/iaa/backfiles1.pep:*
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              hits satisfying chosen parameters:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  September
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       389414 seqs, 51625971 residues
    99.9
76.7
72.4
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       MAPSIDSLATTLANGFTNGS......RIYEAIKDGRINHVLVKMLA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                GenCore version 5.1.6
Copyright (c) 1993 - 2004 Compugen Ltd.
                                                                                                                                                                                                                                                                                                                                                                    Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        2000000000
                                          9, 2004, 10:01:03; Search time 23.4025 Seconds (without alignments)
1588.322 Million cell updates/sec
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Gapext 0
                                                                                                                                                                                                                                                                                                                                                                     BB
 US-09-624-693A-13
US-09-624-693A-21
US-09-624-693A-19
US-09-624-693A-19
US-09-765-873A-35
US-09-765-873A-36
US-09-765-873A-36
US-09-765-873A-37
US-09-765-873A-37
US-09-765-873A-37
US-09-765-873A-37
US-09-765-873A-37
US-09-765-873A-32
US-09-615-192A-320
US-09-615-192A-320
US-09-615-192A-320
US-09-615-192A-320
US-09-615-192A-329
US-08-968-685A-10
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           sw model
                                                                                                                                                                                                                                                                                                                                                                                                        SUMMARIES
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   389414
Sequence 13, Appl Sequence 21, Appl Sequence 19, Appl Sequence 8, Appli Sequence 35, Appli Sequence 10, Appli Sequence 10, Appli Sequence 36, Appli Sequence 36, Appli Sequence 37, Appli Sequence 37, Appli Sequence 37, Appli Sequence 15, Appli Sequence 1575, Appli Sequence 328, Appli Sequence 30046, Appli Sequence 33046, Appli Sequence 33046, Appli Sequence 33046, Appli Sequence 327, Appli Sequence 27, Appli
                                                                                                                                                                                                                                                                                                                                                                     Description
```

2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	Query I Best L Matche Qy Db Db	RESULT 1 US-09-62 Seque: Pacque: Pacque: PappL: APPL: APPL: APPL: TITLI:	22288888888844444 8000888888888888888888
21 GFGGSADTRTEDAVSLQKALIEHQLCGVTPTS 21 GFGGSADTRTEDAVSLQKALIEHQLCGVTPTS 81 SLTRGHSAVRLVVLEALTNFLNHRITPIVPLR 81 SLTRGHSAVRLVVLEALTNFLNHRITPIVPLR 81 SLTRGHSAVRLVVLEALTNFLNHRITPIVPLR 41 VLHEGTEKINFAREAISLFGLEAVVLGPKSGL	AACCH  99.9%; Score 360  cal Similarity 99.9%; Pred. NO.  cal Similarity 99.9%; Pred. NO.  719; Conservative 0; Mismatc  1 MAPSIDSLATTLANGFTNGSHAAPTKSAAG	T 1 -624-693A-13 -624-693A-13 Leence 13, Application US/09624693A Leent No. 16355468 ERAL INFORMATION: PLICANT: Yoshida, Roberta PLICANT: KOOCSTR, Anna PLICANT: KOOCSTR, Anna TLE OF INVENTION: Pelynucleotide Sequence TLE OF INVENTION: Polynucleotide Sequence LE REFERENCE: 29479/500NSC RRENT APPLICATION NUMBER: US/09/624,693A RRENT FILING DATE: 2000-07-24 MBER OF SEQ ID NOS: 25 FTWARE: Patentin Ver. 2.0 ID NO 13 ENGTH: 720 YPE: PRT RGANISM: Rhodotorula graminis -624-693A-13	8 124 3.4 857 4 US-09-252-991A-7 9 118.5 3.3 1832 4 US-09-335-409-4 1118.5 3.3 1832 4 US-09-568-102-4 1118.5 3.3 1832 4 US-09-567-969-4 1118.5 3.3 1832 4 US-09-568-480-4 118.5 3.3 1832 4 US-09-568-480-4 118.5 3.3 1832 4 US-09-568-480-4 118.5 3.3 1832 4 US-09-568-799-4 118.5 3.3 1832 4 US-09-567-999-4 118.5 3.3 1832 4 US-09-613-03-5 118.5 3.3 1832 4 US-09-613-03-5 118.5 3.3 1832 4 US-09-613-192A-1 117 3.2 1839 2 US-09-172-977-4 118.5 3.2 1839 4 US-09-404-108-4 117 3.2 1839 4 US-09-404-108-4 118.5 3.2 1214 2 US-08-231-193A-1 119.5 3.2 1214 2 US-08-231-193A-1 115.5 3.2 1214 2 US-08-231-193A-1 115.5 3.2 1214 2 US-08-231-193A-1 115.5 3.2 1214 2 US-08-231-193A-1
VSSFSVGRGLENTLPLEVVRGAMVIRVN 180 GSIBASGDLSPLSYIAGAITGHPDVKVH 240 [	DB 4; Length /20;  1; Indels 0; G ALRRIPGLDGHAAHQSQLEIVQE	se Polypeptide : and Methods of	sequence 23956, A sequence 4, Appli sequence 5, Appli sequence 5, Appli sequence 3, Appli sequence 3, Appli sequence 3, Appli sequence 4, Appli sequence 4, Appli sequence 3, Appli sequence 3, Appli sequence 4, Appli sequence 3, Appli sequence 54, Appli sequence 54, Appli

```
Sequence 21, Application US/09624693A
Patent No. 6355468
GENERAL INFORMATION:
APPLICANT: Yoshida, Roberta
APPLICANT: Yoshida, Roberta
APPLICANT: Kootstra, Anna
ITITLE OF INVENTION: Polymucleotide Sequences
TITLE OF INVENTION: Using Same
FILE REFERENCE: 29479500NSC
CURRENT APPLICATION NUMBER: US/09/624,693A
CUMRENT FILING DATE: 2000-07-24
NUMBER OF SEQ ID NOS: 25
SOFTWARE: Patentin Ver. 2.0
SEQ ID NO 21
LENGTH: 726
TYPE: PAT
ORGANISM: Artificial Sequence
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 US-09-624-693A-21
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     RESULT 2
US-09-624-693A-21
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                뫄
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Db
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            8
                                                                                                                                                                                                                                                                                                                                                                                                                                      Query Match
Best Local S
Matches 564
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              FEATURE:

FEATUR
                                                                                                                                                                                                                                                                                                                                                                                                                                   Local Sim
     240
                                                181
                                                                                              180
                                                                                                                                                121
                                                                                                                                                                                            120
                                                                                                                                                                                                                                            61
                                                                                                                                                                                                                                                                                       5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 661
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               601
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               541
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          541
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           481
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        481
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         421
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      421
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    361
                                                                                                                                                                                                                                                                                                                                                                                                                              Similarity 77.7
64; Conservative
                                                                                                                                                                                                                                  TGFGGSADTRTEDAVSLQKALIEHQLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIRV 179
                                                                                                                                                                                                                                                                                                                             HVLHEGTEKIMFAREAISLFGLEAVVLGPKEGLGLVNGTAVSASMATLSLHDSHMLSLLS
                                                                                      NSLTRGHSAVRLVVLEALTNFLNHRITPIVPLRGSISASGDLSPLSYIAGAITGHPDVKV
                                                                                                                                         TGFGGSADTRTEDAISLOKALLEHOLCGVLFTSXDSFXLGRGLENSLFLEVVRGAMTIRV
                                                                                                                                                                                                                                                                                                                                                                                MAPSIDSLATTLANGFTNGSHAAPTKSAAGPTSALRRTPGLDGHAAHQSQLEIVQELLSD 60
                                             NSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAITGHPDSKV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      DLRAMELDFKKQFDPLLFTLLQQHLGTGLDVNALALEVKKALNKRLEQTTTYDLEPRWHD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          YLSPRTRVLYSFVREELGVQARRGDVFVGVQQETIGSNVSRIYEAIKDGRINHVLVXXLA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            AFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAISLTREVRNRFWQTPSSQAPAHA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  AFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAISLTREVRNRFWQTPSSQAPAHA 660
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       DLRAMELDFKKQFDPLLPTLLQQHLGTGLDVNALALEVKKALNKRLEQTTTYDLEPRWHD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 AYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQAV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  SAVSISMEKTRLALALIGKLNFTQCTELLNAAMNRGLPSCLAAEDPSLNYHGKGLDIHLA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             EGILAQDRYPLATSPQFLGPLVEDMMHAYSTLSLENNTTTDNPLLDVENKQTAHGGNFQA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                YLSPRIRVLYSFVREELGVQARRGDVFVGVQQETIGSNVSRIYEAIKDGRINHVLVKMLA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 SAVSISMEKTRLALALIGKLNFTQCTELLNAAMNRGLPSCLAAEDPSLNYHGKGLDIHIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     AYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQAV
                                                                                                                                                                                                                                                                                                                                                                                                                                                     76.7%;
77.7%;
                                                                                                                                                                                                                                                                                                                                                                                                                                   40;
                                                                                                                                                                                                                                                                                                                                                                                                                              Score 2770; DB 4;
Pred. No. 1.3e-262;
0; Mismatches 116;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Ammonia Lyase Polypeptide and
de Sequences and Methods of Obtaining
                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Length 726;
                                                                                                                                                                                                                                                                                                                                                                                                                              Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     , 56, 57, 62, no consensus
                                                                                                                                                                                                                                                                                                                                                                                                                              9
                                                                                                                                                                                                                                                                                                                                                                                                                              Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            O.H
                                                                                           239
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   720
                                             240
                                                                                                                                                                                                                                                                                                                                  60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        66,
at that
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            660
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       600
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     600
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 480
                                                                                                                                                                                                                                                                                                                                                                                   APPLICANT: Yoshida, Roberta
APPLICANT: Kootstra, Anna
FITTLE OF INVENTION: Phenylalanine Ammonia Lyase Polypeptide and
FITTLE OF INVENTION: Polynucleotide Sequences and Methods of Obtaining and
FITTLE OF INVENTION: Using Same
FILE REFERENCE: 29479/500NSC
CURRENT APPLICATION NUMBER: US/09/624,693A
CURRENT FILING DATE: 2000-07-24
NUMBER OF SEQ ID NOS: 25
SOFTWARE: Patentin Ver. 2.0
SEQ ID NO 19
LENGTH: 716
TYPE: PAT
ORGANISM: Rhodotorula toruloides
US-09-624-693A-19
                                                                                                                                                      γ
                    B
                                                          S
                                                                                                               멍
                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                      Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     US-09-624-693A-19
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                    Ouery Match 72.4%; Score 2614; DB 4; Best Local Similarity 72.0%; Pred. No. 2.6e-247; Matches 522; Conservative 86; Mismatches 103;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Sequence 19, Application US/09624693A Patent No. 6355468
GENERAL INFORMATION:
                    115
                                                               121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      721
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  661
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  655
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             601
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              541
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         481
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       479
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               715 LVKMLA 720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     421
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                361
                                                                                                               ភ
ភ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   419
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            300
                                                                                                                                                             61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             241
                                                                                                                                                                                                           Н
                                                                                                                                                                                                                                                         Н
               GFGGSADTRTEDAISLQXALLEHQLCGVLPSSFDSFRLGRGLENSLPLEVVRGAMTIRVN
                                                          GFGGSADTRTEDAVSLQKALIEHQLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIRVN
                                                                                                          PIDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVTT
                                                                                                                                                PTDDVVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSVYGVTT
                                                                                                                                                                                                      MAPSLDSISHSFANG-----VASAKQAVNGASTNLAVAGSHLPTTQVTQVDIVEKMLAA 54
                                                                                                                                                                                                                                                      MAPSIDSLATTLANGETNGSHAAPTKSAAGPTSALRRTPGLDGHAAHQSQLEIVQELLSD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              IAAYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         LVKMLA 726
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               SSPALXYLSPRTRVLYSFVREELGVKARRGDVFLGKQEVTIGSNVSRIYEAIKSGRINXV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              QAPAHAYLSPRTRVLYSFVREELGVQARRGDVFVGVQQETIGSNVSRIYEAIKDGRINHV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         AVDLRAMEFEFKKQFXFXXXXLLXQHFGXXXTXXXXXXELXXKVXKXLXKRLEQTNSYDL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        QALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHBEEVKVKD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       EPRWHDAFSXATGTVVEXLSSXXXXXVSLAAVNAWKVAXAEKAISLTRXVRXXFWXAPSS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        EPRWHDAFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAISLTREVRNRFWQTPSS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    AVDLRAMELDFKKOFDFLLFTLLQQHLGTGLDVNA----LALEVKKALNKRLEQTTTYDL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    AAAYTSELGHLANPVTTHVQPAEMGNQAVNSLALISARRTAEANDVLSLLLATHLYCVLQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 QASAVSISMEKTRLALIGKLNFTQCTELLNAAMNRGLPSCLAAEDPSLNYHGKGLDIH 478
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              DEGILRODRYPLRTSPOWLGPLVSDMIHAHAVLSLEAGQSTTDNPLIDVENXXTHHGGNF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                QASAVXNTMEKTRLALALIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            DEGILRQDRYPLRTSPQFLGPLVEDMMHAYSTLSLE-NNTTTDNPLLDVENKQTAHGGNF 418
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       QALTALTVEAMVCHAGSFHPFLHDVTRPHPTQIEVARNIRTLLEGSXFAVHHEEEVKVKD
                                                                                                                                                                                                                                                                                                                                               Length 716;
                                                                                                                                                                                                                                                                                                    Indels
                                                                                                                                                                                                                                                                                                      14;
                                                               180
                                                                                                                                                           120
                    174
                                                                                                             114
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    540
                                                                                                                                                                                                                                                      60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      594
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          714
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           654
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         600
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           660
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  538
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          359
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          300
```

Ş 밁 Ş 밁 Ş Дb Š B Ş

S 뮍 Ś

δ 밁

240

180

114

174

```
8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 US-09-627-216A-8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     RESULT 4
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  뮍
                 밁
                                                                                                                                                                               ; TYPE: PRT ; ORGANISM: Rhodotorula glutinis US-09-627-216A-8
                                               δ
                                                                                                                                                                                                                                       SOFTWARE: Microsoft Office 97
SEQ ID NO 8
LENGTH: 716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Sequence 8, Application US/09627216A Patent No. 6368837
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GENERAL INFORMATION:
                                                                                               Query Match
Best Local Similarity
Matches 522; Conserv
                                                                                                                                                                                                                                                                                                  APPLICANT: Gatenby, Anthony
IITLE OF INVENTION: Bioproduction of para-Hydroxycinnamic
FILE REFERENCE: BC1009 US NA
CURRENT APPLICATION NUMBER: US/09/627,216A
CURRENT FILING DATE: 2000-07-27
PRIOR APPLICATION NUMBER: 60/147,719
PRIOR APPLICATION NUMBER: 60/147,719
PRIOR APPLICATION STATE 1999-08-06
NUMBER OF SEQ ID NOS: 14
NUMBER OF SEQ ID NOS: 14
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      APPLICANT: Sariaslani,
APPLICANT: Tang, Xiao-
APPLICANT: Qi, Wei Wei
                                                                                                                                                                                                                                                                                                                                                                                                                                                                         APPLICANT:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    652
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    475
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  415
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                355
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                295
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                235
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      712
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              SLTRGHAAVRLVVLEALTNETLNHSTTPIVPLRGSISASGDLSPLSYIAAAITGHDVKVH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         VLHEGTEKIMFAREAISLFGLEAVVLGPKEGLGLVNGTAVSASMATLSLHDSHMLSLLSQ 300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   LKMLA 716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          VKMLA 720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 SPALSYLSPRTQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNVL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            PRWHDAFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAISLTREVRNRFWQTPSSQ 655
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         VDLRAMELDFKKQFDFLLFTLLQQHLG---TGLDV-NALALEVKKALNKRLEQTTTYDLE 595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            AAYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     ASAVSISMEKTRLALALIGKLNFTQCTELLNAAMNRGLPSCLAAEDPSLNYHGKGLDIHI 479
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 EGILRQDRYPLRTSPQFLGPLVEDWMHAYSTLSLE-NNTTTDNPLLDVENKQTAHGGNFQ 419
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                SITAMTVEAMVGHAGSFHPFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEVKVKDD
                 MAPSIDSISHSFANG-----VASAKQAVNGASTNLAVAGSHLPTTQVTQVDIVEKMLAA 54
                                                        MAPSIDSLATTLANGFTNGSHAAPTKSAAGPTSALRRTPGLDGHAAHQSQLEIVQELLSD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               PRWHDAPSFAAGTVVEVLSST---SLSLAAVNAWKVAAAESAISLTRQVRETFWSAASTS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    IDLRATEFERKKORGPAIVSLIDOHRGSAMIGSNLRDELVEKVNKTLAKRLEOTNSYDLV 594
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  AAYTSELGHLANPVTTHVQPAEMANQAVNSLALISARRTTESNDVLSLLLATHLYCVLQA 534
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                AAAVANTMEKTRIGIAQIGKINFTQITEMINAGMNRGIPSCLAAEDPSISYHCKGIDIAA 474
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  EGILRODRYPLRTSPQWLGPLVSDLIHAHAVLTIEAGQSTTDNPLIDVENKTSHHGGNFQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                VVHEGKEKILYAREAMALENLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Vannelli,
                                                                                                   Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Wei Wei
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Xiao-Song
                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Todd
                                                                                                 72.4%; Score 2614; DB 4; 72.0%; Pred. No. 2.6e-247; tive 86; Mismatches 103;
                                                                                                                                        Length 716;
                                                                                                   14;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   294
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 234
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             539
                                                            60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             715
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      651
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  414
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  354
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                皮
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                     RESULT 5
US-09-765-873A-8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      뫄
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                              US-09-765-873A-8
                                                                                                                                          SOFTWARE: Microsoft Office 97
SEQ ID NO 8
                                                                                                                                                                                                                                                                                                                                                                                                            Sequence 8, Application US/09765873A Patent No. 6521748
                                                                                                                                                                                                                                                                                                                                                                                           GENERAL INFORMATION:
Query Match
Best Local Similarity
                                                                                                                                                                                 APPLICANT: Tang, Xiao-Song
APPLICANT: Tang, Xiao-Song
TITLE OF INVENTION: BIOPRODUCTION OF PARA-HYDROXYCINNAMIC ACID
FILE REPERENCE: BOLOOP US CIP
CURRENT APPLICATION NUMBER: US/09/765,873A
CURRENT FILING DATE: 2001-01-19
PRIOR APPLICATION NUMBER: US 09/627,216
PRIOR FILING DATE: 2000-07-27
PRIOR FILING DATE: 2000-07-27
PRIOR PRIOR APPLICATION NUMBER: US 60/147,719
PRIOR APPLICATION NUMBER: US 60/147,719
PRIOR FILING DATE: 1999-08-06
PRIOR FILING DATE: 1999-08-06
NUMBER OF SEQ ID NOS: 38
                                                                                                   LENGTH: 716
TYPE: PRT
                                                                                  ORGANISM: Rhodotorula glutinis
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     175
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   115
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    235
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        652
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               596
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        535
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      475
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        415
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      355
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      295
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          712 LKMLA 716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              716 VKMLA 720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            656 APAHAYLSPRTRVLYSFVREELGVQARRGDVFVGVQQETIGSNVSRIYEAIKDGRINHVL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   55
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             ASAVSISMEKTRLALIGKLNFTQCTELLNAAMNRGLPSCLAAEDPSLNYHGKGLDIHI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     SLTRGHSAVRLVVLEALTNFLNHRITPIVPLRGSISASGDLSPLSYIAGAITGHPDVKVH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   GFGGSADTRTEDAISLOKALLEHOLCGVLPSSFDSFRLGRGLENSLPLEVVRGAMTIRVN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             GFGGSADTRTEDAVSIOKALIEHQLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIRVN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 PTDDVVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSVYGVTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      IDLRAIEFEFKKOFGPAIVSLIDOHFGSAMTGSNLRDELVEKVNKTLAKRLEOTNSYDLV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    SLTAMTVEAMVGHAGSFHPFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          ALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         VLHEGTEKIMFAREAISLFGLEAVVLGPKEGLGLVNGTAVSASMATLSLHDSHMLSLLSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  SLTRGHSAVRLVVLEALTNELNHGITFIVFLRGTISASGDLSPLSYIAAAISGHEDSKVH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     SPALSYLSPRTQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNVL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         EGILRODRYPLRTSPOFLGPLVEDMMHAYSTLSLE-NNTTTDNPLLDVENKQTAHGGNFQ 419
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       VVHEGKEKILYAREAMALENLEPVVLGEKEGLGLVNGTAVSASMATLALHDAHMLSLLSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    PRWHDAFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAISLTREVRNRFWQTPSSQ 655
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           VDLRAMELDFKKOFDPLLPTLLQQHLG---TGLDV-NALALEVKKALNKRLEQTTTYDLE 595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      AAYTSELGHLANPVTTHVQPAEMANQAVNSLALISARRTTESNDVLSLLLATHLYCVLQA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             AAYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        AAAVANTMEKTRIGIAQIGKINFTQITEMINAGMNRGIPSCLAAEDPSISYHCKGIDIAA 474
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        PRWHDAFSFAAGTVVEVLSST---SLSLAAVNAWKVAAAESAISLTRQVRETFWSAASTS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      EGILRODRYPLRTSPOWLGPLVSDLIHAHAVLTIEAGOSTTDNPLIDVENKTSHHGGNFO
    72.4%;
      Score 2614; DB 4;
Pred. No. 2.6e-247;
                         Length
```

멼

S 밁

479

414

360 294 300 234

354

534

539

715

651

Š 밁 Ş

밁 Ś 밁 Ş

Š

```
Sequence 35, Application US/09765873A

Patent No. 6521748

GENERAL INFORMATION:
APPLICANT: Tang, Xiao-Song
ITITLE OF INVENTION: BIOPRODUCTION OF PARA-HYDROXYCINNAMIC ACI
FILE REFERENCE: BC1009 US CIP
CURRENT FILING DATE: 2001-01-19
PRIOR APPLICATION NUMBER: US/09/765,873A
CURRENT FILING DATE: 2000-07-27
PRIOR APPLICATION NUMBER: US 09/627,216
PRIOR APPLICATION NUMBER: US 09/627,719
PRIOR FILING DATE: 1999-08
NUMBER OF SEQ ID NOS: 38
SOFTWARE: Microsoft Office 97
SEQ ID NO 35
LENGTH: 716
                                                                                                                                                                                                                                                     RESULT 6
US-09-765-873A-35
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Matches
                                                                                                                                                                                                                                                                                                                        712
                                                                                                                                                                                                                                                                                                                                                     716
                                                                                                                                                                                                                                                                                                                                                                                     652
                                                                                                                                                                                                                                                                                                                                                                                                                   656
                                                                                                                                                                                                                                                                                                                                                                                                                                                   595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 596
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              475
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          415
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        355
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        295
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     235
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        522;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       13
                                                                                                                                                                                                                                                                                                                        LKMILA
                                                                                                                                                                                                                                                                                                                                                      VIMILA
                                                                                                                                                                                                                                                                                                                                                                                   SPALSYLSPRIQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNVL
                                                                                                                                                                                                                                                                                                                                                                                                  APAHAYLSPRIRVLYSFVREELGVQARRGDVFVGVQQETIGSNVSRIYEAIKDGRINHVL
                                                                                                                                                                                                                                                                                                                                                                                                                                              VDLRAMELDFKKQFDFLLFTLLQQHLG----TGLDV-NALALEVKKALNKRLEQTTTYDLE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         AAYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       AAAVANTMEKTRIGIAQIGKINFTQLTEMINAGMNRGLPSCLAAEDPSLSYHCKGLDIAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                VVHEGKEKILYAREAMALFNIEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMISILSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                GFGGSADTRTEDAVSLQKALIEHQLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIRVN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   EGILRODRYPLRTSPOWLGPLVSDLIHAHAVLTIEAGOSTTDNPLIDVENKTSHHGGNFO
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                SITAMTVEAMVGHAGSFHPTLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       VLHEGTEKIMFAREAISLFGLEAVVLGFKEGLGLVNGTAVSASMATLSLHDSHMLSLLSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              SITRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAISGHPDSKVH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     MAPSIDSISHSFANG-----VASAKQAVNGASTNLAVAGSHLPTTQVTQVDIVEKMLAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            IDLRAIBFEFKKOFGPAIVSLIDOHFGSAMTGSNLRDELVEKVNKTLAKRLEOTNSYDLV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             ASAVSISMEKTRLALALIGKLNFTQCTELLNAAMNRGLPSCLAAEDPSLNYHGKGLDIHI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   EGILRODRYPLRTSPQFLGPLVEDMMHAYSTLSLE-NNTTTDNPLLDVENKQTAHGGNFQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               SUTRGHSAVRLVVLEALTNFLNHRITPIVPLRGSISASGDLSPLSYIAGAITGHPDVKVH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            GFGGSADTRTEDAISLQXALLEHQLCGVLPSSFDSFRLGRGLENSLPLEVVRGAMTIRVN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             PTDDVVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSVYGVTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       MAPSIDSLATTLANGFTNGSHAAPTKSAAGPTSALRRTPGIDGHAAHQSQLEIVQELLSD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          PTDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Conservative
                                                                                                                                                                                                                                                                                                                        716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        86
•
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Mismatches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       103;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       14;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Gaps
                                                                                                                                                                                                                                                                                                                                                                                                              715
                                                                                                                                                                                                                                                                                                                                                                                                                                                                               655
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              594
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            534
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          539
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          474
                                                                                                                                                                                                                                                                                                                                                                                                                                                651
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        479
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     419
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       414
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     354
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 294
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              234
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            174
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          180
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         114
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        54
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          120
RESULT 7
US-09-627-216A-10
; Sequence 10, Application
; Patent No. 6368837
; GENERAL INFORMATION:
                                                                                                                                                                         ₽,
                                                                                                                                                                                                                                      밁
                                                                                                                                    Š
                                                                                                                                                                                                 S
                                                                                                                                                                                                                                                                 Ş
                                                                                                                                                                                                                                                                                                                             Ş
                                                                                                                                                                                                                                                                                                                                                               B
                                                                                                                                                                                                                                                                                                                                                                                        S
                                                                                                                                                                                                                                                                                                                                                                                                                               뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                          8
                                                                                                                                                                                                                                                                                                  B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           문
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           뭉
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         ; LOCATION: (54
; OTHER INFORMA
US-09-765-873A-35
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Query Match
Best Local S
Matches 522
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  TYPE: PRT
ORGANISM: mutant from RF
FEATURE: UNSURE
LOCATION: (198)...(198)
OTHER INFORMATION: X= A:
NAME/KEY: UNSURE
LOCATION: (540)...(540)
OTHER INFORMATION: X= T)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Local Similarity
nes 522; Conserv
                                                                                                                                         716
                                                                                                                                                                         652
                                                                                                                                                                                                                                       595
                                                                                                                                                                                                                                                                                                      535
                                                                                                                                                                                                                                                                                                                                  540
                                                                                                                                                                                                                                                                                                                                                                  475
                                                                                                                                                                                                        656
                                                                                                                                                                                                                                                                      596
                                                                                                                                                                                                                                                                                                                                                                                                480
                                                                                                                                                                                                                                                                                                                                                                                                                               415
                                                                                                                                                                                                                                                                                                                                                                                                                                                             420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               355
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           295
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        235
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        175
                                                                                                              712 LKMLA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  ភ
ភ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               \vdash
                                                                                                                                             VKMLA
                                                                                                                                                                         SPALSYLSPRTQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNVL
                                                                                                                                                                                                                                                            PRWHDAFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAISLTREVRNRFWQTPSSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            ALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEVKVKDD
                                                                                                                                                                                                      APAHAYLSPRTRVLYSFVREELGVQARRGDVFVGVQQETIGSNVSRIYEAIKDGRINHVL
                                                                                                                                                                                                                                                                                                                               VDLRAMELDEKKQFDPLLETLLQQHLG---TGLDV-NALALEVKKALNKRLEQTTTYDLE
                                                                                                                                                                                                                                                                                                                                                               AAYTSELGHLANPVTTHVQPAEMANQAVNSLALISARRTTESNDVLSLLLATHLYCVLQA
                                                                                                                                                                                                                                                                                                                                                                                     AAYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQA
                                                                                                                                                                                                                                                                                                                                                                                                                               AAAVANTMEKTRLGLAQI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           EGILRODRYPLRTSPOWLGPLVSDLIHAHAVLTIEAGOSTTUNPLIDVENKTSHHGGNFQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         EGILRQDRYPLRTSPQFLGPLVEDMMHAYSTLSLE-NNTTTDNPLLDVENKQTAHGGNFQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         SLTAMTVEAMVGHAGSFHPFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    VVHEGKEKILYAREAMALFNLEFVVLGFKEGLGLVNGTAVSASMATLALHDAHMLSLLSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        VLHEGTEKIMFAREAISLFGLEAVVLGPKEGLGLVNGTAVSASMATLSLHDSHMLSLLSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    SUTRGHSAVRLVVLEALINFLNHXITPIVPLRGTISASGDLSPLSYIAAAISGHPDSKVH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        SLTRGHSAVRLVVLEALTNFLNHRITPIVPLRGSISASGDLSPLSYIAGAITGHPDVKVH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          GFGGSADTRTEDAVSLQKALIEHQLCGVTPTSXSSFSVGRGLENTLFLEVVRGAMVIRVN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               TDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           MAPSIDSISHSFANG-----VASAKQAVNGASTNIAVAGSHLPTTQVTQVDIVEKMIAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              MAPSLDSLATTLANGFTNGSHAAPTKSAAGPTSALRRTPGLDGHAAHQSQLEIVQELLSD
                                                                                                                                                                                                                                                                                                      IDLRAXEFEFKKOFGPAIVSLIDOHFGSAMTGSNLRDELVEKVNKTLAKRLEOTNSYDLV
                                                                                                                                                                                                                                                                                                                                                                                                                                                           ASAVSISMEKTRLALALIGKLNFTQCTELLNAAMNRGLPSCLAAEDPSLNYHGKGLDIHI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GFGGSADTRTEDAISLQKALLEHQLCGVLPSSFDSFRLGRGLENSLPLEVVRGAMTIRVN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        PTDDVVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSVYGVTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Conservative
                                                                                                              716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          72.4%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Thr,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Asp,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Rhodotorula glutinis
                                 US/09627216A
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ala,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Asn,
                                                                                                                                                                                                                                                                                                                                                                                                                               GKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           85; Mismatches 104;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Score 2613;
Pred. No. 3
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ser,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Glu,
                                                                                                                                                                                                                                      SLSLAAVNAWKVAAAESAISLTRQVRETFWSAASTS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Pro,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Gln
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          .2e-247;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Gly
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          DB 4;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           14;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Gaps
```

414 419 354 360 294 300

234 240 174 180 114 120 54

ហ

539 474

715

655 594 595

651

Ş

8 8 8 8

Ş 뭐 5 Вb Ś ď Ś В Ş 멼 δ 망 S В 8 밁 Ş 밁 S g

```
8
                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                          Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              문
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              맑
                                                                                            Ś
                                                                                                                                     밁
                                                                                                                                                                       S
                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                         Š
                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           OTHER INFORMATION: Description of Artificial Sequence: mutant; OTHER INFORMATION: Rhodtorula glutinis
US-09-627-216A-10
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          APPLICANT: Gatenby, Anthony
TITLE OF INVENTION: Bioproduction of para-Hydroxycinnamic.
FILE REFERENCE: BC1009 US NA
CURRENT APPLICATION NUMBER: US/09/627,216A
CURRENT FILING DATE: 2000-07-27
PRIOR APPLICATION NUMBER: 60/147,719
PRIOR APPLICATION NUMBER: 60/147,719
PRIOR FILING DATE: 1999-08-06
NUMBER OF SEQ ID NOS: 14
SOFTWARE: Microsoft Office 97
SEQ ID NO 10
LENGTH: 716
TYPE: DET
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Query Match
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        APPLICANT: Sariaslani, Sima
APPLICANT: Tang, Xiao-Song
APPLICANT: Qi, Wei Wei
APPLICANT: Vannelli, Todd
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         TYPE: PRT
ORGANISM: Artificial Sequence
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Match 72.4%; Score 2612; DB 4; Length Local Similarity 72.0%; Pred. No. 4e-247; es 522; Conservative 85; Mismatches 104; Indels
                                                                                                                                                                                                                                                                                                                                                                                                                            361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        181
                                                                                                                                                                              540
                                                                                                                                                                                                                      475
                                                                                                                                                                                                                                                             480
                                                                                                                                                                                                                                                                                                                                            420
                                                                                                                                                                                                                                                                                                                                                                                     355
                                                                                                                                                                                                                                                                                                                                                                                                                                                                   295
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  235
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 115
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        121
                 656
                                                          595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       SLTRGHSAVRLVVLEALTNFLNHRITPIVPLRGSISASGDLSPLSYIAGAITGHPDVXVH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GFGGSADTRTEDAVSLQKALIEHQLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIRVN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              PTDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            PTDDVVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSVYGVTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     MAPSIDSLATTLANGETNGSHAAPTKSAAGPTSALRRTPGIDGHAAHQSQLEIVQELISD
PRWHDAFSFAAGTVVEVLSST---SLSLAAVNAWKVAAAESAISLTRQVRETFWSAASTS
                                                                                                                                                                           VDLRAMELDEKKOFDELLETILOOHLG---TGLDV-NALALEVKKALNKELEOTTTYDLE 595
                                                                                                                                                                                                                                                         AAYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQA
                                                                                                                                                                                                                                                                                                    AAAVANTMEKTRLGLAQIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIAA
                                                                                                                                                                                                                                                                                                                                            ASAVSISMEKTRLALALIGKLNFTQCTELLNAAMNRGLPSCLAAEDPSLNYHGKGLDIHI
                                                                                                                                                                                                                                                                                                                                                                                     EGILRODRYPLRTSPOWLGPLVSDLIHAHAVLTIEAGQSTTDNPLIDVENKTSHHGGNFQ
                                                                                                                                                                                                                                                                                                                                                                                                               EGILRODRYPLRTSPOFLGPLVEDMMHAYSTLSLE-NNTTTDNPLLDVENKOTAHGGNFQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                SLTAMTVEAMVGHAGSFHPFLHDVTRPHPTQTEVAGNIRKLLEGSRFAVHHEEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         ALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  VVHEGKEKILYAREAMALENLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         VLHEGTEKIMFAREAISLEGLEAVVLGPKEGLGLVNGTAVSASMATLSLHDSHMLSLLSQ 300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  SLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAISGHPDSKVH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               GFGGSADTRTEDAISLQKALLEHQLCGVLPSSFDSFRLGRGLENSLPLEVVRGAMTIRVN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            MAPSIDSISHSFANG-----VASAKQAVNGASTNIAVAGSHIPTTQVTQVDIVEKMLAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Qi, Wei we
Vannelli,
                                                                                                                                                                                                                    AAYTSELGHLANPVTTHVQPAEMANQAVNSLALISARRTTESNDVLSLLLATHLYCVLQA
                                                                                            PRWHDAFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAISLTREVRNRFWQTPSSQ
                                                                                                                                       IDLRATEFEFKKOFGPAIVSLIDOHFGSAMTGSNLRDELVEKVNKTLAKRLEOTNSYDLV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Indels 14;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Gaps
                 715
                                                          651
                                                                                              655
                                                                                                                                                                                                                    534
                                                                                                                                                                                                                                                             539
                                                                                                                                                                                                                                                                                                      474
                                                                                                                                                                                                                                                                                                                                            479
                                                                                                                                                                                                                                                                                                                                                                                     414
                                                                                                                                                                                                                                                                                                                                                                                                                            419
                                                                                                                                                                                                                                                                                                                                                                                                                                                                   354
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  294
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  234
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               174
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       120
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              υ
4,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       60
```

SPALSYLSPRIQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNVL

```
FILE REFERENCE: BC1009 US CIP
CURRENT APPLICATION NUMBER: US/09/765,873A
CURRENT FILING DATE: 2001-01-19
PRIOR APPLICATION NUMBER: US 09/627,216
PRIOR APPLICATION NUMBER: US 09/627,216
PRIOR APPLICATION NUMBER: US 60/147,719
PRIOR FILING DATE: 1999-08-06
NUMBER OF SEQ ID NOS: 38
SOFTWARE: Microsoft Office 97
SEQ ID NO 10
LENGTH: 716
                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ş
                                                              δ
                                                                                                          В
                                                                                                                                            S
                                                                                                                                                                                    맑
                                                                                                                                                                                                                    Ş
                                                                                                                                                                                                                                                              뫄
                                                                                                                                                                                                                                                                                            8
                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                         Š
                                                                                                                                                                                                                                                                                                                                                                                                                   멍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             멍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Дb
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     ď
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              US-09-765-873A-10
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           US-09-765-873A-10
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Sequence 10, Application US/09765873A
Patent No. 6521748
GENERAL INFORMATION:
APPLICANT: Tang, Xiao-Song
TITLE OF INVENTION: BIOPRODUCTION OF PARA-HYDROXYCINNAMIC ACID
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Matches 522;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Query Match
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    TYPE: PRT ORGANISM: mutant from Rhodotorula glutinis
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Local Similarity
                                                                                                                                                                                                                                                                                                                                                                               301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     115
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           121
                                                                      540
                                                                                                                                                480
                                                                                                                                                                                      415
                                                                                                                                                                                                                        420
                                                                                                                                                                                                                                                                355
                                                                                                                                                                                                                                                                                                    361
                                                                                                                                                                                                                                                                                                                                         295
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             175
                                                                                                                                                                                                                                                                                                                                                                                                                                               241 VLHEGTEKIMFAREAISLFGLEAVVLGPKEGLGLVNGTAVSASMATLSLHDSHMLSLLSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   712 LKMLA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        716 VKMLA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ហ
ហ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            μ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1 MAPSIDSLATTIANGFTNGSHAAPTKSAAGPTSALRRTPGIDGHAAHQSQLEIVQEILSD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 GFGGSADTRTEDAVSLQKALIEHQLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIRVN
                                                                                                                                  AAYASELGHLANPUTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQA 539
                                                                                                                                                                                                                                                                                          EGILRQDRYPLRTSPQFLGPLVEDMMHAYSTLSLE-NNTTTDNPLLDVENXQTAHGGNFQ
                                                                                                                                                                                                                                                                                                                                                                           ALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       SUTRGHSAVRLVVLEALTNFLNHRITPIVPLRGSISASGDLSPLSYIAGAITGHPDVKVH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       GFGGSADTRTEDAISLQKALLEHQLCGVLPSSFDSFRLGRGLENSLPLEVVRGAMTIRVN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  PTDDVVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSVYGVTT
PRWHDAFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAISLTREVRNRFWQTPSSQ
                                    IDLRATEFEFKKOFGPAIVSLIDOHFGSAMTGSNLRDELVEKVNKTLAKRLEOTNSYDLV 594
                                                                    VDLRAMELDEKKQFDPLLPTLLQQHLG---TGLDV-NALALEVKKALNKRLEQTTTYDLE
                                                                                                              AAYTSELGHLANPVTTHVQPAEMANQAVNSLALISARRTTESNDVLSLLLATHLYCVLQA
                                                                                                                                                                                    <u>AAAVANTMEKTRIGIAQIGKINFTQITEMINAGMNRGIPSCLAAEDPSISYHCKGIDIAA</u>
                                                                                                                                                                                                                        ASAVSISMEKTRLALALIGKLNFTQCTELLNAAMNRGLPSCLAAEDPSLNYHGKGLDIHI 479
                                                                                                                                                                                                                                                              EGILRODRYPLRTSPOWLGPLVSDLIHAHAVLTIEAGOSTTDNPLIDVENKTSHHGGNFO
                                                                                                                                                                                                                                                                                                                                         SLTAMTVEAMVGHAGSFHFFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                                                                                     VVHEGKEKILYAREAMALFNLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             SLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAISGHPDSKVH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 PTDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            MAPSIDSISHSFANG-----VASAKQAVNGASTNLAVAGSHLPTTQVTQVDIVEKMLAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    72.4%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    85; Mismatches 104;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Score 2612; DB 4;
Pred. No. 4e-247;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Length 716;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    14;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Gaps
                                                                                                              534
                                                                        595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 114
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            5
4
                                                                                                                                                                                                                                                                414
                                                                                                                                                                                                                                                                                                      419
                                                                                                                                                                                                                                                                                                                                           354
                                                                                                                                                                                                                                                                                                                                                                               360
                                                                                                                                                                                                                                                                                                                                                                                                                     294
                                                                                                                                                                                                                                                                                                                                                                                                                                                         300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             234
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         174
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      120
```

```
SOFTWARE: Microsoft Office 97

SEQ ID NO 38

LENGTH: 716

TYPE: PRT

ORGANISM: mutant from Rhodotorula glutinis

PEATURE:

NAME/KEY: UNSURE
LOCATION: (502)..(502)

OTHER INFORMATION: X= Gly, Ala, Ser, Thr, Pro
                                                                                    В
                                                                                                                      Ś
                                                                                                                                                                     망
                                                                                                                                                                                                              Ş
                                                                                                                                                                                                                                                                      밁
                                                                                                                                                                                                                                                                                                          Ş
                                                                                                                                                                                                                                                                                                                                                             В
                                                                                                                                                                                                                                                                                                                                                                                                      Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ъ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       US-09-765-873A-38
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  RESULT 9
US-09-765-873A-38
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GENERAL INFORMATION:
APPLICANT: Tang, Xiao-Song
APPLICANT: Tang, Xiao-Song
TITLE OF INVENTION: BIOPRODUCTION OF PARA-HYDROXYCINNAMIC ACID
FILE REFERENCE: BC1009 US CIP
CURRENT FILING DATE: C001-01-19
PRIOR APPLICATION NUMBER: US 09/627,216
PRIOR APPLICATION NUMBER: US 09/627,216
PRIOR FILING DATE: 2000-07-27
PRIOR APPLICATION NUMBER: US 60/147,719
PRIOR FILING DATE: 1999-08-06
NUMBER OF SEQ ID NOS: 38
NUMBER OF SEQ ID NOS: 38
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Sequence 38, Ap
Patent No. 6521
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Matches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Query Match
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   NAME/KEY: UNSURE
LOCATION: (540)...(540)
OTHER INFORMATION: X= Thr, Ala, Ser, Pro,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Local
                                                                                                                                                                              235
                                                                                                                                                                                                                                                                        175
355
                                         361
                                                                                       295
                                                                                                                                   301
                                                                                                                                                                                                                          241
                                                                                                                                                                                                                                                                                                                    181
                                                                                                                                                                                                                                                                                                                                                                115
                                                                                                                                                                                                                                                                                                                                                                                                           121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   712
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      959
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           521; Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                            55
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ы
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Н
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Similarity
                             EGILRQDRYPLRTSPQPLGPLVEDMMHAYSTLSLE-UNTTTDNPLLDVENKQTAHGGNFQ
                                                                                       SLTAMTVEAMVGHAGSFHPFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEEVKVKDD
                                                                                                                         ALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEVKVKDD
                                                                                                                                                                                                                          VLHEGTEKIMFAREAISLFGLEAVVLGPKEGLGLVNGTAVSASMATLSLHDSHMLSLLSQ
                                                                                                                                                                                                                                                                                                                    SLTRGHSAVRLVVLEALTNFLNHRITPIVPLRGSISASGDLSPLSYIAGAITGHPDVKVH
                                                                                                                                                                                                                                                                                                                                                                GFGGSADTRTEDAISLQKALLEHQLCGVLPSSFDSFRLGRGLENSLPLEVVRGAMTIRVN
                                                                                                                                                                                                                                                                                                                                                                                                  GFGGSADTRTEDAVSLQKALIEHQLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIRVN
                                                                                                                                                                                                                                                                                                                                                                                                                                                         PTDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   MAPSLDSISHSFANG-----VASAKQAVNGASTNLAVAGSHLPTTQVTQVDIVEKMLAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             MAPSIDSLATTLANGFTNGSHAAPTKSAAGPTSALRRTPGIDGHAAHQSQLEIVQELLSD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               VKMLA 720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   APAHAYLSPRTRVLYSFVREELGVQARRGDVFVGVQQETIGSNVSRIYEAIKDGRINHVL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  PRWHDAFSFAAGTVVEVLSST---SLSLAAVNAWKVAAAESAISLTRQVRETFWSAASTS
EGILRODRYPLRTSPOWLGPLVSDLIHAHAVLTIEAGOSTTDNPLIDVENKTSHHGGNFO
                                                                                                                                                                                 VVHEGKEKILYAREAMALFNLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLSQ
                                                                                                                                                                                                                                                                        SLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAISGHPDSKVH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     PIDDVVELSGYSLIVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSVYGVTT 120
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   LKMLA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          SPALSYLSPRIQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNVL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Application US/09765873A
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              72.2%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             85; Mismatches 105;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Score 2607; DB 4;
Pred. No. 1.3e-246;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Gly
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Length 716;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           14;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Gaps
                                           419
                                                                                                                                                                                                                          300
                                                                                                                                                                                                                                                                                                                    240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      715
                                                                                                                                   360
  414
                                                                                         354
                                                                                                                                                                              294
                                                                                                                                                                                                                                                                           234
                                                                                                                                                                                                                                                                                                                                                                  174
                                                                                                                                                                                                                                                                                                                                                                                                              180
                                                                                                                                                                                                                                                                                                                                                                                                                                                         114
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   54
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             711
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    651
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Sequence 36, Application US/09765873A

Parent NO. 6521748

GENERAL INFORMATION:
APPLICANT: Tang, Xiao-Song
ITILE OF INVENTION: BIOPRODUCTION OF PARA-HYDROXYCINNAMIC ACID
FILE REFERENCE: BC1009 US CIP
CURRENT APPLICATION NUMBER: US/09/765,873A
CURRENT FILING DATE: 2001-01-19
PRIOR APPLICATION NUMBER: US 09/627,216
PRIOR FILING DATE: 2000-07-27
PRIOR FILING DATE: 2000-07-27
PRIOR APPLICATION NUMBER: US 60/147,719
PRIOR FILING DATE: 1999-08-06
NUMBER OF SEG ID NOS: 38
SOFTWARE: Microsoft Office 97
SEGUING OF 15 CONTROL OF 15 CONTRO
                                                                                                                                                                              밁
                                    Ş
                                                                                       뮍
                                                                                                                              Š
                                                                                                                                                                                                                        S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      RESULT 10
US-09-765-873A-36
  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                  US-09-765-873A-36
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            뭐
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              50
                                                                                                                                                                                                                                                                           Matches
                                                                                                                                                                                                                                                                                              Query Match
Best Local S
                                                                                                                                                                                                                                                                                                                                                                                     NAME/KEY: UNSURE
LOCATION: (540)..(540)
OTHER INFORMATION: X= Thr, Ala,
                                                                                                                                                                                                                                                                                                                                                                                                                                                     NAME/KEY: UNSURE
LOCATION: (235)...(235)
OTHER INFORMATION: X= Ala,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         NAME/KEY: UNSURE
LOCATION: (181)..(181)
OTHER INFORMATION: X=
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               TYPE: PRT
ORGANISM: mutant
FEATURE:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ENGTH: 716
                                           121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            652
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 596
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             535
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    475
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              415
                                                                                                                                                                                                                                                                        520;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              716 VKMLA 720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                656 APAHAYLSPRIRVLYSFVREELGVQARRGDVFVGVQQETIGSNVSRIYEAIKDGRINHVL 715
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               712 LKMLA
                                                                                         ម្រ
                                                                                                                                   61
                                                                                                                                                                                 _
                                                                                                                                                                                                                            1 MAPSIDSLATTLANGFTNGSHAAPTKSAAGPTSALRRTPGLDGHAAHOSQLEIVQELLSD
                                                                                                                                                                                                                                                                                                Similarity
                                 GFGGSADTRTEDAVSLQKALIEHQLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIRVN
  GFGGSADTRTEDAISLOKALLEHOLCGVLPSSFDSFRLGRGLENSLPLEVVRGAMTIRVN
                                                                                                                              PTDDVVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSVYGVTT
                                                                                                                                                                                 MAPSIDSISHSFANG-----VASAKQAVNGASTNLAVAGSHLPTTQVTQVDIVEKMLAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            SPALSYLSPRIQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNVL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           IDLRAXEFEFKKQFGPAIVSLIDQHFGSAMTGSNLRDELVEKVNKTLAKRLEQTNSYDLV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      AAYASELGHLANPYTTFYQPAEMGNQAYNSLALISARRTAEANDVLSLLLASHLYCTLQA 539
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ASAVSISMEKTRLALALIGKLNFTQCTELLNAAMNRGLPSCLAAEDPSLNYHGKGLDIHI 479
                                                                                            PTDSTLELDGYSLNLGDVVSÅARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            PRWHDAFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAISLTREVRNRFWQTPSSQ 655
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    VDLRAMELDEKKQEDELLETLLQQHLG---TGLDV-NALALEVKKALNKRLEQTTTYDLE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    AAYTSELGHLANPVTTHVQPAEMANQAXNSLALISARRTTESNDVLSLLLATHLYCVLQA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            AAAVANTMEKTRIGIAQIGKINFTQITEMINAGMNRGIPSCLAAEDPSISYHCKGIDIAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 PRWHDAFSFAAGTVVEVLSST---SLSLAAVNAWKVAAAESAISLTRQVRETFWSAASTS
                                                                                                                                                                                                                                                                           Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       from Rhodotorula
                                                                                                                                                                                                                                                                                            72.1%;
71.7%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Pro,
                                                                                                                                                                                                                                                                                                                                                                                                                                                            Gly,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ala,
                                                                                                                                                                                                                                                                        85;
                                                                                                                                                                                                                                                                        Score 2603; DE
Pred. No. 3.1e-
95; Mismatches
                                                                                                                                                                                                                                                                                                                                                                                        Ser,
                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ser,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ser,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     glutinis
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Thr,
                                                                                                                                                                                                                                                                                                                                                                                          Pro,
                                                                                                                                                                                                                                                                                                                                                                                                                                                              Thr,
                                                                                                                                                                                                                                                                           DB 4;
3.1e-246;
1es 106;
                                                                                                                                                                                                                                                                                                                                                                                        Gly
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Gly
                                                                                                                                                                                                                                                                                                                    Length 716;
                                                                                                                                                                                                                                                                           Indels
                                                                                                                                                                                                                                                                           14;
                                                                                                                                                                                                                                                                           Gaps
                                              180
                                                                                            114
                                                                                                                                       120
                                                                                                                                                                                   54
                                                                                                                                                                                                                               60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               594
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    534
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 474
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      651
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           595
    174
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              711
```

S

Ś 밁

Length Indels

716;

14;

```
RESULT 11
US-09-765-873A-37
                    FEATURE:
NAME/KEY: UNSURE
LOCATION: (149)...(149)
OTHER INFORMATION: X= Pro, A
NAME/KEY: UNSURE
LOCATION: (202)...(202)
OTHER INFORMATION: X= Val, M
NAME/KEY: UNSURE
LOCATION: (540)...(540)
OTHER INFORMATION: X= Thr, A
US-09-765-873A-37
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Sequence 37, Application US/09765873A Patent No. 6521748
GENERAL INFORMATION:
                                                                                                                                                                                                                                                                                                    SOFTWARE: Microsoft Office 97
SEQ ID NO 37
LENGTH: 716
                                                                                                                                                                                                                                                                                                                                                                 APPLICANT: Tang, Xiao-Song
TITLE OF INVENTION: BIOPRODUCTION OF PARA-HYDROXYCINNAMIC ACID
FILE REFERENCE: BOLOOP US CIP
GURRENT APPLICATION NUMBER: US/09/765,873A
CURRENT FILING DATE: 2001-01-19
PRIOR APPLICATION NUMBER: US 09/627,216
PRIOR FILING DATE: 2000-07-27
PRIOR APPLICATION NUMBER: US 09/627,216
PRIOR APPLICATION NUMBER: US 09/627,719
PRIOR APPLICATION NUMBER: US 60/147,719
PRIOR PILING DATE: 1999-08-06
NUMBER OF SEQ ID NOS: 38
                                                                                                                                                                                                                                                              ORGANISM: mutant
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         712
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          652
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     656
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    475
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      415
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           355
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             235
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               LKMLA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  VKMLA 720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         PRWHDAFSFAAGTVVEVLSST---SLSLAAVNAWKVAAAESAISLTRQVRETFWSAASTS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        IDLRAXEFEFKKQFGPAIVSLIDQHFGSAMTGSNLRDELVEKVNKTLAKRLEQTNSYDLV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ASAVSISMEKTRLALALIGKLNFTQCTELLNAAMNRGLPSCLAAEDPSLNYHGKGLDIHI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       EGILRODRYPLRTSPOWLGPLVSDLIHAHAVLTIEAGOSTTDNPLIDVENKTSHHGGNFQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    EGILRQDRYPLRTS?QFLGPLVEDMMHAYSTLSLE-NNTTTDNPLLDVENKQTAHGGNFQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          SLTAMTVEAMVGHAGSFHPFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEVKVXDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      VLHEGTEKIMFAREAISLFGLEAVVLGPKEGLGLVNGTAVSASMATLSLHDSHMLSLLSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          SPALSYLSPRTQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNVL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  PRWHDAFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAISLTREVRNRFWQTPSSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       VDLRAMBLDFKKOFDPLLPTLLQQHLG---TGLDV-NALALEVKKALNKRLEQTTTYDLE 595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                AAYTSELGHLANPVTTHVQPAEMANQAVNSLALISARRTTESNDVLSLLLATHLYCVLQA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           AAYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQA 539
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      AAAVANTMEKTRIGIAQIGKINFTQITEMINAGMNRGIPSCLAAEDPSISYHCKGIDIAA 474
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  ALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           XVHEGKEKILYAREAMALFNLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHNLSLLSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            SLTRGHXAVRLVVLEALTNELNHGITPIVPLRGTISASGDLSPLSYIAAAISGHPDSKVH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   SUTRGHSAVRLVVLEALTNFLNHRITPIVPLRGSISASGDLSPLSYIAGAITGHPDVXVH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         716
                                                                                                                                                                                                                                                              from
                                                                                                                                                                                                                                                            Rhodotorula glutinis
                                               Ala,
                                                                                                            Met,
                                               Ser,
                                                                                                            Leu,
                                                                                                                                                                           Ser,
                                               Pro,
                                               Gly
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              479
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         2 414
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            651
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  534
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          711
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   715
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      655
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               594
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 419
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          354
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           294
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              234
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     240
GENERAL INFORMATION:
APPLICANT: Tang, Xiao-Song
TITLE OF INVENTION: BIOPRODUCTION OF PARA-HYDROXYCINNAMIC ACI
FILE REFERENCE: BC1009 US CIP
CURRENT APPLICATION NUMBER: US/09/765,873A
CURRENT FILING DATE: 2001-01-19
PRIOR APPLICATION NUMBER: US 09/627,216
PRIOR APPLICATION NUMBER: US 09/627,719
PRIOR APPLICATION NUMBER: US 60/147,719
PRIOR APPLICATION NUMBER: US 60/147,719
PRIOR FILING DATE: 1999-08-06
NUMBER OF SEQ ID NOS: 38
SOFTWARE: Microsoft Office 97
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               5
                                                                                                                                                                                                                                                                                                       RESULT 12
US-09-765-873A-34
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                δõ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         멍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                            Sequence 34, Application US/09765873A Patent No. 6521748
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Query Match 72.1
Best Local Similarity 71.7
Matches 520; Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        656
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    535
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         475
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  480 AAYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQA 539
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          415
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            355
                                                                                                                                                                                                                                                                                                                                                                                            712
                                                                                                                                                                                                                                                                                                                                                                                                                                                                               652
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               295
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    235
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      175
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         115
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 121
                                                                                                                                                                                                                                                                                                                                                                                                                                     716 VKMLA 720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            ភ
ភ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             ш
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    ш
                                                                                                                                                                                                                                                                                                                                                                                                                                                                               SPALSYLSPRTQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNVL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      APAHAYLSPRTRVLYSFVREELGVQARRGDVFVGVQQETIGSNVSRIYEAIKDGRINHVL 715
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            VDLRAMELDFKKQFDPLLPTLLQQHLG---TGLDV-NALALEVKKALNKRLEQTTTYDLE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           VLHEGTEKIMFAREAISLFGLEAVVLGPKEGLGLVNGTAVSASMATLSLHDSHMLSLLSQ 300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     SLTRGHSAVRLVVLEALTNFLNHRITPIVPLRGSISASGDLSPLSYIAGAITGHPDVKVH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GFGGSADTRTEDATSLOKALLEHOLCGVLPSSFDXFRLGRGLENSLPLEVVRGAMTIRVN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GFGGSADTRTEDAVSLOKALIEHQLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIRVN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                PTDDVVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSVYGVTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           MAPSIDSISHSFANG-----VASAKQAVNGASTNIAVAGSHIPTTQVTQVDIVEKMLAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    MAPSIDSLATTIANGFTNGSHAAPTKSAAGPTSALRRTPGLDGHAAHQSQLEIVQELLSD
                                                                                                                                                                                                                                                                                                                                                                                            LKMLA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          AAAVANTMEKTRLGLAQIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ASAVSISMEKTRLALALIGKLNFTQCTELLNAAMNRGLPSCLAAEDPSLNYHGKGLDIHI 479
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               SLTAMTVEAMVGHAGSFHPFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEVKVKDD 360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    IDLRAXEFEFKKQFGPAIVSLIDQHFGSAMTGSNLRDELVEKVNKTLAKRLEQTNSYDLV 594
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            EGILRQDRYPLRTSPQWLGPLVSDLIHAHAVLTIEAGQSTTDNPLIDVENKTSHHGGNFQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    EGILRQDRYPLRTSPQFLGPLVEDMMHAYSTLSLE-NNTTTDNPLLDVENKQTAHGGNFQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      SLTRGHSAVRLVVLEALTNFLNHGITPXVPLRGTISASGDLSPLSYIAAAISGHPDSKVH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          PTDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                PRWHDAFSFAAGTVVEVLSST---SLSLAAVNAWKVAAAESAISLTRQVRETFWSAASTS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              PRWHDAFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAISLTREVRNRFWQTPSSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       <u>AAYTSELGHLANPVTTHVQPAEMANQAVNSLALISARRTTESNDVLSLLLATHLYCVLQA</u>
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                VVHEGKEKILYAREAMALFNLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLSQ
                                                                                                                                                                                                                                                                                                                                                                                            716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                72.1%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          .%; Score 2603; DB 4;
%; Pred. No. 3.1e-246;
85; Mismatches 106;
```

595

534

474

651 655 419

354

294

414

240 174

234

114 120 54

ACID

S В Ş 밁 Š В. Ş 밁 á S

В Ş 밁 Ś Β̈́

```
5
                                                밁
                                                                   ő
                                                                                             밁
                                                                                                                       Ş
                                                                                                                                                   밁
                                                                                                                                                                      Ś
                                                                                                                                                                                                    B
                                                                                                                                                                                                                         5
                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                Ś
                                                                                                                                                                                                                                                                                                             맑
                                                                                                                                                                                                                                                                                                                              δ
                                                                                                                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                                                                                   S
                                                                                                                                                                                                                                                                                                                                                                                                                뭐
                                                                                                                                                                                                                                                                                                                                                                                                                                        Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ; OTHER INFORMATION: X= Thr, Ala, US-09-765-873A-34
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Query Match
Tocal Similarity
Conser
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       FEATURE:
NAME/KEY: UNSURE
LOCATION: (126)..(126)
OTHER INFORMATION: X= Gly, I
NAME/KEY: UNSURE
LOCATION: (138)..(138)
OTHER INFORMATION: X= Leu, N
NAME/KEY: UNSURE
LOCATION: (540)..(540)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               SEQ ID
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         LENGTH: 716
TYPE: PRT
ORGANISM: mutant
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    NO 34
TH: 716
                                                 652
712
                        716 VKMLA 720
                                                                          656
                                                                                                    595
                                                                                                                           596
                                                                                                                                                                              540
                                                                                                                                                                                                        475
                                                                                                                                                                                                                                480
                                                                                                                                                                                                                                                          415
                                                                                                                                                                                                                                                                                    420
                                                                                                                                                                                                                                                                                                             355
                                                                                                                                                                                                                                                                                                                                     361
                                                                                                                                                                                                                                                                                                                                                               295
                                                                                                                                                                                                                                                                                                                                                                                        301
                                                                                                                                                                                                                                                                                                                                                                                                                 235
                                                                                                                                                                                                                                                                                                                                                                                                                                          241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                  175
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       115
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        55
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           ш
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     щ
LKMLA
                                                  SPALSYLSPRIQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNVL
                                                               PRWHDAFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAISLTREVRNRFWQTPSSQ
                                                                                                                                                                             VDLRAMELDFKKQFDFLLFTLLQQHLG---TGLDV-NALALEVKKALNKRLEQTTTYDLE 595
                                                                                                                                                                                                       AAYTSELGHLANPVTTHVQPAEMANQAVNSLALISARRTTESNDVLSLLLATHLYCVLQA
                                                                                                                                                                                                                      AAYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQA
                                                                                                                                                                                                                                                        AAAVANTMEKTRIGIAQIGKINFTQLTEMINAGMNRGIPSCIAAEDPSISYHCKGIDIAA
                                                                                                                                                                                                                                                                            ASAVSISMEKTRLALIGKLNFTQCTELLNAAMNRGLPSCLAAEDPSLNYHGKGLDIHI
                                                                                                                                                                                                                                                                                                           EGILRODRYPLRTSPOWLGPLVSDLIHAHAVLTIEAGOSTTDNPLIDVENKTSHHGGNFQ
                                                                                                                                                                                                                                                                                                                                   EGILRODRYPLRTSPOFIGELVEDMMHAYSTLSLE-NNTTTDNPLLDVENKQTAHGGNFQ
                                                                                                                                                                                                                                                                                                                                                              SLTAMTVEAMVGHAGSFHPFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                                             ALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEVKVKVDD
                                                                                                                                                                                                                                                                                                                                                                                                                                 SLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAISGHPDSKVH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          SLTRGHSAVRLVVLEALTNFLNHRITPIVPLRGSISASGDLSPLSYIAGAITGHPDVKVH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GFGGSADTRTEXAISLQKALLEHXLCGVLPSSFDSFRLGRGLENSLPLEVVRGAMTIRVN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GFGGSADTRTEDAVSLOKALIEHQLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIRVN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             PTDDVVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSVYGVTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           MAPSIDSISHSFANG-----VASAKQAVNGASTNLAVAGSHLPTTQVTQVDIVEKMLAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  MAPSIDSLATTLANGFTNGSHAAPTKSAAGPTSALRRTPGLDGHAAHQSQLEIVQELLSD
                                                                                                    PRWHDAFSFAAGTVVEVLSST---SLSLAAVNAWKVAAAESAISLTROVRETFWSAASTS
                                                                                                                                                     IDLRAXEFEFKKQFGPAIVSLIDQHFGSAMTGSNLRDELVEKVNKTLAKRLEQTNSYDLV
                                                                                                                                                                                                                                                                                                                                                                                                                 VVHEGKEKILYAREAMALFNLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        PTDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Conservative
716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          from Rhodotorula glutinis
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         72.0%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Met,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ala,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              85;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Score 2599; DE
Pred. No. 7.6e-
85; Mismatches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ser,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ile,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ser,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Pro,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Val,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          .6e-246;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Gly
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Cys
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       DB 4;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             106;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Length 716;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             14;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             240
                                                                          715
                                                                                                                             655
                                                                                                                                                                                                                                539
                                                                                                                                                                                                                                                           474
                                                                                                                                                                                                                                                                                     479
                                                                                                                                                                                                                                                                                                              414
                                                                                                                                                                                                                                                                                                                                     419
                                                                                                                                                                                                                                                                                                                                                                                        360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              180
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  120
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           54
                                                  711
                                                                                                    651
                                                                                                                                                                                                        534
                                                                                                                                                                                                                                                                                                                                                                 354
                                                                                                                                                                                                                                                                                                                                                                                                                 294
                                                                                                                                                                                                                                                                                                                                                                                                                                           300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                    234
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       174
```

```
PRIOR APPLICATION NUMBER: US 09/627,216
PRIOR FILING DATE: 2000-07-27
PRIOR APPLICATION NUMBER: US 60/147,719
PRIOR FILING DATE: 1999-08-06
NUMBER OF SEQ ID NOS: 38
SOFTWARE: Microsoft Office 97
SEQ ID NO 33
LENGTH: 716
                                                       밁
                                                                               Ś
                                                                                                                                           Ś
                                                                                                                                                                             뮍
                                                                                                                                                                                                                                      밁
                                                                                                                                                                                                                                                                                                                                                               , NAME/KEY: UNSURE
, LOCATION: (540)...(540)
, OTHER INFORMATION: X=Thr, Ala,
US-09-765-873A-33
                     Ś
                                                                                                                 밁
                                                                                                                                                                                                       Ś
                                                                                                                                                                                                                                                                   8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         RESULT 13
US-09-765-873A-33
                                                                                                                                                                                                                                                                                         Query Match
Best Local Similarity 71.0
Matches 515; Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            GENERAL INFORMATION:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Sequence 33, Application Patent No. 6521748
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       NAME/KEY: UNSURE
LOCATION: (138)..(138)
OTHER INFORMATION: X= Leu, I
NAME/KEY: UNSURE
LOCATION: (149)..(149)
OTHER INFORMATION: X= Pro, I
NAME/KEY: UNSURE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               APPLICANT: Tang, Xiao-Song
TITLE OF INVENTION: BIOPRODUCTION OF PARA-HYDROXYCINNAMIC
FILE REFERENCE: BC1009 US CIP
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 CURRENT APPLICATION NUMBER: US/09/765,873A CURRENT FILING DATE: 2001-01-19
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              TYPE: PRT
                                                                                                                                                                                                                                                                                                                                                                                                                         LOCATION: (502)..(502)
OTHER INFORMATION: X= Gly,
                                                                                                                                                                                                                                                                                                                                                                                                                                                        NAME/KEY: UNSURE
LOCATION: (235)...(235)
OTHER INFORMATION: X= Ala,
NAME/KEY: UNSURE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                LOCATION: (198)...(198)
OTHER INFORMATION: X= Asp,
NAME/KEY: UNSURE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           LOCATION: (181)..(181)
OTHER INFORMATION: X= Pro,
NAME/KEY: UNSURE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  COCATION: (202)..(202)
OTHER INFORMATION: X= Val,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  LOCATION: (126)..(126)
OTHER INFORMATION: X=
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              ORGANISM: mutant
                                                                                                                   115
                           241
                                                        175
                                                                                    181
                                                                                                                                                121
                                                                                                                                                                              55
                                                                                                                                                                                                          61
                                                                                                                                                                                                                                         Н
                                                                                                                                                                                                                                                                    1 MAPSIDSLATTLANGFINGSHAAPTKSAAGPTSALRRIPGIDGHAAHQSQLEIVQELLSD
                                                                                                                                   GFGGSADTRTEDAVSLQKALIEHQLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIRVN
           SLTRGHSAVRLVVLEALTNFLNHRITBIVPLRGSISASGDLSPLSYIAGAITGHPDVKVH
XVHEGKEKILYAREAMALFNLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLSQ
                                                          SLTRGHXAVRLVVLBALTNFLNHXITPXVPLRGTISASGDLSPLSYIAAAISGHPDSKVH
                                                                                                                 GFGGSADTRTEXAISLOKALLEHXLCGVLPSSFDXFRLGRGLENSLPLEVVRGAMTIRVN
                                                                                                                                                                             PTDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVTT
                                                                                                                                                                                                                                          MAPSIDSISHSFANG-----VASAKQAVNGASTNLAVAGSHLPTTQVTQVDIVEKMLAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              from Rhodotorula glutinis
                                                                                                                                                                                                                                                                                                                71.4%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Gly,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            US/09765873A
                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Gly,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ala,
                                                                                                                                                                                                                                                                                                   86;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Met,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Asn,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ala,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ser,
                                                                                                                                                                                                                                                                                                 Score 2579; DB 4
Pred. No. 7e-244;
6; Mismatches 11
                                                                                                                                                                                                                                                                                                                                                                               Ser,
                                                                                                                                                                                                                                                                                                                                                                                                                      Ser,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ser,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ser,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ala,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Leu,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Glu,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ile,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ser,
                                                                                                                                                                                                                                                                                                                                                                               Pro,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Thr,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Thr,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Thr,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Val,
                                                                                                                                                                                                                                                                                                                                                                                                                             Thr,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Gln
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Thr
                                                                                                                                                                                                                                                                                                                                                                               Gly
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Gly
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Gly
                                                                                                                                                                                                                                                                                                                                DB 4;
                                                                                                                                                                                                                                                                                                     110;
                                                                                                                                                                                                                                                                                                                                Length 716;
                                                                                                                                                                                                                                                                                                     Indels
                                                                                                                                                                                                                                                                                                   14;
                                                                                                                                                                                                                                                                                                     Gaps
```

294

240 234 180

120

5 4 60

UI

```
RESULT 14

US-09-765-873A-32

Sequence 32, Application US/09765873A

Patent No. 6521748

GENERAL INFORMATION: BIOPRODUCTION OF PARA-HYDROXYCINNAMIC ACII
FILE OF INVENTION: BIOPRODUCTION OF PARA-HYDROXYCINNAMIC ACII
FILE REFERENCE: BC1009 US CIP
CURRENT APPLICATION UNUBER: US/09/765,873A

CURRENT FILING DATE: 2001-01-19
PRIOR APPLICATION NUMBER: US 09/627,216
PRIOR FILING DATE: 2000-07-27
PRIOR APPLICATION NUMBER: US 60/147,719
PRIOR FILING DATE: 1999-08-06

NUMBER OF SEQ ID NOS: 38

SOSTWARE: Microsoft Office 97

SEQ ID NO 32
LENGTH: 686

TYPE: DEFO
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          뭣
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Š
                                                                                       밁
                                                                                                                    Ş
                                                                                                                                                        문
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        B.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               맒
                            占
                                                       8
                                                                                                                                                                                   Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     닭
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ś
                                                                                                                                                                                                                                                                                     US-09-765-873A-32
                                                                                                                                                                                                                        Query Match
Best Local S
Matches 507
                                                                                                                                                                                                                                                                                                    TYPE: PRT ORGANISM: mutant from Rhodotorula glutinis
                                                                                                                                                                                                                        Local Similarity
les 507; Conserv
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           712
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           652
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       596
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       475
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 355
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            301
                              133
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    420
                                                            169
                                                                                            73
                                                                                                                                                                                        49
                                                                                                                                                         13
                                                                                                                    AQLQNSVYGVTTGFGGSADTRTEDAVSLQKALIEHQLCGVTPTSXSSFSVGRGLENTLPL 168
                                                                                         SQLSMSVYGVTTGFGGGSADTRTEDAISLQKALLEHQLCGVLPSSFDSFRLGRGLENSLPL
                                                                                                                                                                                        SQLEIVQELLSDPTDDVVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLK 108
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           LKMLA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           VKMLA 720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        SPALSYLSPRTQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNVL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   VDLRAMELDFKKQFDFLLFTLLQQHLG---TGLDV-NALALEVKKALNKRLEQTTTYDLE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               AAYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQA 539
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               EGILRODRYPLRTSPOWLGPLVSDLIHAHAVLTIEAGOSTTDNPLIDVENKTSHHGGNFO
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    ALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEVKVKDD
GAITGHPDVKVHVLHEGTEKIMFAREAISLFGLEAVVLGPKEGLGLVNGTAVSASMATLS
                              EVVRGAMTIRVNSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIA
                                                  EVVRGAMVIRVNSLTRGHSAVRLVVLEALTNFLNHRITPIVPLRGSISASGDLSPLSYIA
                                                                                                                                                         TOVDÍVEKMLAAPTÖSTLELDGYSLNLGDVVSÁARKGRPVRVKDSDEÍRSKIDKSVEFLR
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 APAHAYLSPRTRVLYSFVREELGVQARRGDVFVGVQQETIGSNVSRIYEAIKDGRINHVL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       PRWHDAPSFAAGTVVEVLSST---SLSLAAVNAWKVAAAESAISLTRQVRETFWSAASTS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  PRWHDAFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAISLTREVRNRFWQTPSSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       IDLRAIEFEFKKQFGPAIVSLIDQHFGSAMTGSNLRDELVEKVNKTLAKRLEQTNSYDLV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    AAYTSELGHLANPVTTHVQPAEMANQAXNSLALISARRTTESNDVLSLLLATHLYCVLQA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    ANAVANTMEKTRIGIAQIGKINFTQITEMINAGMNRGIPSCLAAEDPSISYHCKGIDIAA 474
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     ASAVSISMEKTRLALALIGKLNFTQCTELLNAAMNRGLPSCLAAEDPSLNYHGKGLDIHI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               EGILRODRYPLRTSPOFLGPLVEDMMHAYSTLSLE-NNTTTDNPLLDVENKQTAHGGNFQ 419
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              SLTAMTVEAMVGHAGSFHPFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEVKVKDD
                                                                                                                                                                                                                        Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             716
                                                                                                                                                                                                                    71.3%; Score 2573; DB 4; 74.9%; Pred. No. 2.5e~243; tive 83; Mismatches 79;
                                                                                                                                                                                                                                                     Length 686;
                                                                                                                                                                                                                        Indels
                                                                                                                                                                                                                        ъ
••
                                                                                                                                                                                                                        Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             711
                              192
                                                                                            132
                                                                                                                                                           72
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          651
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       655
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       594
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 414
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            360
                                        Š
                                                                             밁
                                                                                                       Ş
                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           뮹
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      뮹
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            맑
               밁
                                                                                                                                                                     Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ş
```

```
Sequence 17, Application US/09624693A
Fatent No. 6355468
GENERAL INFORMATION:
APPLICANT: Yoshida, Roberta
APPLICANT: Kootstra, Anna
TITLE OF INVENTION: Phenylalanine Ammonia Lyase Polypeptide and
TITLE OF INVENTION: Polynuclectide Sequences and Methods of Obtaining and
TITLE OF INVENTION: Using Same
FILE REFERENCE: 29479/5008C
CURRENT APPLICATION UNMBER: US/09/624,693A
CURRENT FILING DATE: 2000-07-24
NUMBER OF SEQ ID NOS: 25
SOFTWARE: Patentin Ver. 2.0
SEQ ID NO 17
LENGTH: 713
                                                                                                                                                                                                                                                                                                                        ; LENGTH: 713
; TYPE: PRT
; ORGANISM: Rhodotorula mucilaginosa
US-09-624-693A-17
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          RESULT 15
US-09-624-693A-17
                                                                                                                                                                                                                                     Query Match
Best Local Similarity
Matches 511; Conserv
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             670
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  704
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          610
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 644
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  584
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         493
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                528
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        433
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 468
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     373
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              408
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       313
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           349
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 193
                                    113 NSVYGVTTGFGGSADTRTEDAVSLQKALIEHQLCGVTFTSXSSFSVGRGLENTLPLEVVR 172
                                                                               53
                                                                                                                     υ
4,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Alighpdskyhvvhegkekilyareamalfnlepvvlgpkeglglvngtavsasmatla
                                                                          MAPSIDSLATTLANGFTNGSHAAPT-----KSAAGPTSALRRTPGLDGHAAHQSQLEI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         EAIKDGRINHVLVKMLA 720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                VRNRFWQTPSSQAPAHAYLSPRTRVLYSFVREELGVQARRGDVFVGVQQETIGSNVSRIY
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        LSYHCKGLDIAAAAYTSELGHLANPVTTHVQPAEMANQAVNSLALISARRTTESNDVLSL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               ENKTSHHGGNFQAAAVANTMEKTRLGLAQIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           ENKQTAHGGNFQASAVSISMEKTRLALIALIGKLNFTQCTELLNAAMNRGLPSCLAAEDPS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              VEHEEEVKVKDDEGILRODRYPLRTSPQFLGPLVEDMMHAYSTLSLE-NNTTTDNPLLDV 407
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                LHDSHMLSLLSQALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFA 348
NSVYGVTTGFGGSADTRTEDAISLQKALLEHQLCGVLPTSMDGFALGRGLENSLPLEVVR
                                                                                                                                                              MAPSVDSIATSVANSLSNGLHAAAAANGGDVHKKTAGAGSLLPTT-----ETTQLDI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        KRLEQINSYDLVPRWHDAFSFAAGTVVEVLSST---SLSLAAVNAWKVAAAESAISUTRQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              KRLEOTTTYDLEPRWHDAFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAISLTRE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       LLASHLYCTLQAVDLRAMELDFKKQFDFLLFTLLQQHLG---TGLDV-NALALEVKKALN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  LNYHGKGLDIHIAAYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     VHHEEEVKVKDDEGILRQDRYPLRTSPQWLGPLVSDLIHAHAVLTIEAGQSTTDNPLIDV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    LHDAHMLSLLSQSLTAMTVEAMVGHAGSFHPFLHDVTRPHPTQIEVAGNIRKLLEGSRFA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          VRETFWSAASTSSPALSYLSPRTQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIY
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         LLATHLYCVLQAIDLRAIBFEFKKQFGPAIVSLIDQHFGSAMTGSNLRDELVEKVNKTLA
                                                                                                                                                                                                                                             Conservative
                                                                                                                                                                                                                                                            69.2%; Score 2499.5; 69.6%; Pred. No. 4.5e
                                                                                                                                                                                                                                             83
                                                                                                                                                                                                                                           ed. No. 4.5e-236;
Mismatches 105;
                                                                                                                                                                                                                                                                                  DB 4;
                                                                                                                                                                                                                                             Indels
                                                                                                                                                                                                                                                                                Length 713;
                                                                                                                                                                                                                                             35;
    172
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       372
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   252
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     703
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            609
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  643
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  583
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          492
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 527
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       432
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              467
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      312
                                                                                                                                                              52
                                                                                                                                                                                                       53
```

707 K		Qy 587 E Db 583 C		Oy 532 H Db 529 H	532 532 532	412 409 472 469 532 529	353 349 412 409 532 532	293 289 353 349 412 529 529	233 233 293 293 349 349 349 349 349 353 353 353 353
KDGRINHVLVK	RFWQTPSSQAP	7 EQTTTYDLEPRWHDAFSYATGTVVELLSSSPSANVILTAVNAMKVASAEKAISLTREVRN 		2 HLYCTLQAVDLRAMELDFXKQFDPLLPTLLQQHLGTGLDVNALAL- 			ж—ж о о н—н н в	ж—ж о о н—н н <b>ж</b> ж—ж	ж—ж о о н—н н <b>ж</b> ж—ж о—о
720	APAHAYLSPRTRVI	PRWHDAFSYATGT		DLRAMELDFKKQFI            DLRAMEFEHTKAFI	AYASELGHLANPVT	SAVSISMEKTRLAI	EVKYXDDEGIIRQDRYPLRTSPQFLGPLVEDMMHAYSTLSLE-NNTTTDNPLLDVENKQ	LTALIVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSF	THEGTEKIMFAREJ
7 1	RVLYS	TGAVVEALAGQ-	1	KAFEPMVTELLKO	NPVTTFVOPAEMO	RLALALIGKLNF;    :  :	ETSPOFLGPLVEI RCSPOMLGPLVSI RCSPOMLGPLVSI RCSPOMLGPLVSI RLALALIMGKVSFI RLAVALMGKVSFI R	GOOGSFAPFIHD  GHAGSFHPPLHD  GHAGSFHPPLHD  GHAGSFHPPLHD  REALIGELVSI  REALIALIGKLNF  REAVALMGKVSF  RE	KIMFAREAISLFGLEAVVLGPKEGLGLVNGTAVSASMATLSLHDS
L AND DA AND AND AND AND AND AND AND AND	elgvoarrgdv  :  :	SPSANVTLTAV   :   :     :   :   :		LQQHLGTGLDV  :     LKQHFG	EMGNQAVNSLA	NFTQCTELLNA                   SFTQLTEMLNA SFTQLTEMLNA SEMGNQAVNSLA                     EMGNQAINSLA EMGNQAINSLA LQQHLGTGLDV	PQFLGPLVEDMMHAYSTLSLE-NNTTTDNPLLDVENKQ	HDVTRPHPGOV HDVTRPHPTQI VEDMCHAYSTL	EAVVLGPKEGL
Y E E G S K E V	VFVGVQQET	NVTLTAVNAWKVASAEKAISLTREVRN  : ::		E :	ALISARRTA          ALISARRTA VNALAL    ALATAEV	AAMNRGLPS	LSLE-NNTT            SIEFAGGST  AAMNRGLES                AGMNRLLPS AGMNRALPS ALISARRTA ALISARRTA ALISARRTA ALISARRTA ALISARRTA ALISARRTA	VEVARNIRT	LGLYNGTAV           VEVARNIRT  :        IEVARNIRT  :        LSLE-NTT     -N!    LSLEAGOST AAMNRGLPS AGMNRALPS AGMNRALPS AGMNRALPS ALISARRTA ALISARRTA ALISARRTA ALISARRTA ALISARRTA
		EKA EKA		EVK : : VEDKVR	4EANDV 4EANDV 4EANDV EVK : :	SCLAAEI             SCLAAEI SCLAAEI               EANDVI AEANDVI AEANDVI OEDKVRH	TIDNPLL	ILLSGSS	VSASMATISIHDS
- G + 14 < 0 %	SNVSRI	ITTA  - - - ITTS		KS - K	LSI LSI	Si S		FAVEHE	

Search completed: September 9, 2004, 10:09:38 Job time : 26.4025 secs

GenCore version 5.1.6 Copyright (c) 1993 - 2004 Compugen Ltd

```
Result
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Post-processing: Minimum Match 0%
Maximum Match 100%
Listing first 45 s
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Minimum DB
Maximum DB
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Total number of hits satisfying chosen parameters:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Scoring table:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Sequence:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Perfect score:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Run on:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           OM protein -
                                                                                                                                                                                                                                                                                                                                                                          No.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Pred. No. is the number of results predicted by chance to have a score greater than or equal to the score of the result being printed, and is derived by analysis of the total score distribution.
2614
2614
2614
2613
2613
2613
2613
2613
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 seq length: 0
seq length: 2000000000
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      protein search, using sw model
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Published Applications AA:*

1: /cgn2_6/ptodata/2/pubpaa/US07_PUBCOMB.pep:*

2: /cgn2_6/ptodata/2/pubpaa/US06_NEW_PUB.pep:*

3: /cgn2_6/ptodata/2/pubpaa/US06_NEW_PUB.pep:*

4: /cgn2_6/ptodata/2/pubpaa/US06_NEW_PUB.pep:*

5: /cgn2_6/ptodata/2/pubpaa/US06_NEW_PUB.pep:*

6: /cgn2_6/ptodata/2/pubpaa/US08_NEW_PUB.pep:*

7: /cgn2_6/ptodata/2/pubpaa/US08_NEW_PUB.pep:*

8: /cgn2_6/ptodata/2/pubpaa/US08_PUBCOMB.pep:*

9: /cgn2_6/ptodata/2/pubpaa/US09A_PUBCOMB.pep:*

10: /cgn2_6/ptodata/2/pubpaa/US09A_PUBCOMB.pep:*

11: /cgn2_6/ptodata/2/pubpaa/US09A_PUBCOMB.pep:*

12: /cgn2_6/ptodata/2/pubpaa/US09A_PUBCOMB.pep:*

13: /cgn2_6/ptodata/2/pubpaa/US09A_PUBCOMB.pep:*

14: /cgn2_6/ptodata/2/pubpaa/US09_NEW_PUB.pep:*

15: /cgn2_6/ptodata/2/pubpaa/US10A_PUBCOMB.pep:*

16: /cgn2_6/ptodata/2/pubpaa/US10C_PUBCOMB.pep:*

17: /cgn2_6/ptodata/2/pubpaa/US10_PUBCOMB.pep:*

18: /cgn2_6/ptodata/2/pubpaa/US00_NEW_PUB.pep:*

16: /cgn2_6/ptodata/2/pubpaa/US00_NEW_PUB.pep:*

17: /cgn2_6/ptodata/2/pubpaa/US00_NEW_PUB.pep:*

18: /cgn2_6/ptodata/2/pubpaa/US00_NEW_PUB.pep:*
                                                                                                                                                                                                                                                                                                                                                                        Query
Match
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 US-09-939-408A-13
3610
1 MAPSLDSLATTLANGFTNGS......RIYEAIKDGRINHVLVKMLA 720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         September 9, 2004, 10:07:54; Search time 92.6141 Seconds (without alignments) 2493.103 Million cell updates/sec
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       BLOSUM62
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1335176 seqs, 320689617 residues
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Gapop 10.0 , Gapext 0.5
Length
                                                                                                                                                                                                                                                                                                                                                                          ₽B
                   US-09-939-408A-13
US-09-939-408A-21
US-09-939-408A-21
US-09-765-873A-8
US-09-765-873A-8
US-10-188-523B-8
US-10-188-523B-8
US-10-439-478-15
US-10-138-970A-19
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            summaries
                                                                                                                                                                                                                                                                                                                                                                                                                                             SUMMARIES
                 Sequence 13, Appl
Sequence 30, Appli
Sequence 30, Appli
Sequence 8, Appli
Sequence 19, Appli
Sequence 4, Appli
Sequence 2, Appli
Sequence 2, Appli
Sequence 2, Appli
Sequence 19, Appl
Sequence 15, Appl
Sequence 15, Appl
Sequence 10, Appl
                                                                                                                                                                                                                                                                                                                                                                        Description
  Sequence 24,
```

prianbas	14 US-IU-138-9/UA	/ <u>L</u>	11.4	U	Ü
Sequence	US-09-765-873A-33	71	-	2579	44
	15 US-10-374	71	72.0	ú	3
Sequenc	15 US-10-374-366-	71,		Ü	12
Seq	15 US-10-439-478-1	71,	N	ú	Ë
Seguenc	15 US-10-374-366-1	71.	ν.	ū	Ö
æ	14 US-10-188-523B-3	71,	'n	m	õ
Seguenc	14 US-10-138-970A-	71	.2	Ü	8
Ω.	9 US-09-765-873A-3	71.		Ü	7
The same	15 US-10-374-366-1	,71	'n	Ö	8
Sequenc	15 US-10-439-478-1	71		ð	ັທ
Seguenc	15 US-10-439-478-1	71.	'n	σ	4
Sequ	14 US-10-188-523B-3	71,	'n	g	ω
Sequ	14 US-10-188-523B-3	71	ν.	g	ñ
Sequence	14 US-10-138-970A-	71		g	Ä
Sequenc	14 US-10-138-970A-2	71	72.1	o.	õ
	9 US-09-765-873	71		o,	ĕ
ıΩ	9 US-09-765-873A-3	71,	'n	ø.	ö
Seguenc	15 US-10-374-366-1	71	ν.	o,	7
Sequenc	15 US-10-374-366-1	71	'n	o	6
Sequence	15 US-10-374-366-	71		o,	ίň
Segu	15 US-10-439-478-1	710	'n	o	4,
Sequenc	15 US-10-374-366-	, 71		g	ü
Sequenc	14 US-10-188-523B-3	710	٥.	g	Ŋ
Th.	14 US-10-138-970A-	710	2	g	ŭ
Sequence	9 US-09-765-873A-3	710	'n	a)	0
Œ	15 US-10-374-366-2	716		Ø,	Ó
Sequenc	15 US-10-374-366-2	71:	72.3	σ <sub>0</sub>	ά
Sequ	15 US-10-374-366-	71	2	ത	7
Sequ	14 US-10-188-523	716	72.4	ത	O

## ALIGNMENTS

```
Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     RESULT 1
US-09-939-408A-13
                                          В
                                                                                5
                                                                                                                                                                                                                US-09-939-408A-13
                                                                                                                           Query Match
Best Local S
Matches 720
                                                                                                                                                                                                                                                                                                                                                            SOFTWARE: PatentIn Ver.
SEQ ID NO 13
LENGTH: 720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Sequence 13, Application US/09939408A Patent No. US20020102712A1 GENERAL INFORMATION:
                                                                                                                                                                                                                                                                                                                                                                                                                        CURRENT APPLICATION NUMBER: US/09/939,408A
CURRENT FILING DATE: 2001-08-24
PRIOR APPLICATION NUMBER: US 09/624,693
PRIOR FILING DATE: 2000-07-24
PRIOR APPLICATION NUMBER: PCT/US01/23270
PRIOR FILING DATE: 2001-07-24
NUMBER: OF SEQ ID NOS: 30
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             APPLICANT: KOOTSTIA, Anna
TITLE OF INVENTION: Phenylalanine Ammonia Lyase
TITLE OF INVENTION: Polynucleotide Sequences ar
TITLE OF INVENTION: Using Same
FILE REFERENCE: 29479/500NSCA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  APPLICANT: Yoshida, Roberta APPLICANT: Kootstra, Anna
                                                                                                                                                                                                                                  TYPE: PRT
ORGANIAM: Rhodotorula graminis
FEATURE:
NAME/KBY: unsure
LOCATION: (153)
OTHER INFORMATION: Other information:
                                                                                                                           Match 99.9%; Score 3608; I
Local Similarity 100.0%; Pred. No. 0;
Es 720; Conservative 0; Mismatches
  61
                                                                     1 MAPSIDSIATTLANGFTNGSHAAFTKSAAGFTSALRRTFGLDGHAAHQSQLEIVQELLSD
PTDDVVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSVYGVTT 120
                                            MAPSIDSLATTLANGFINGSHAAPTKSAAGPTSALRRTPGLDGHAAHQSQLEIVQELLSD
                                                                                                                                                                                                                                                                                                                                                                                                           2.0
                                                                                                                                                                                                                                       Xaa = Val or Ala
                                                                                                                                                                      DB 9; Length 720;
                                                                                                                                o
,-
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Polypeptide and
nd Methods of Obtaining
                                                                                                                                Indels
                                                                                                                                0
                                                                                                                                Gaps
                                               60
                                                                                         60
                                                                                                                                0;
```

```
Sequence 21, Application US/09939408A
Patent No. US20020102712A1
GENERAL INFORMATION:
APPLICANT: Yoshida, Roberta
APPLICANT: Yoshida, Roberta
APPLICANT: Yoshida, Roberta
APPLICANT: Yoshida, Anna
ITITLE OF INVENTION: Polynucleotide Sequences and M
TITLE OF INVENTION: Using Same
FILE OF INVENTION: Using Same
FILE OF INVENTION NUMBER: US/09/939,408A
CURRENT APPLICATION NUMBER: US/09/939,408A
CURRENT FILING DATE: 2001-08-24
PRIOR APPLICATION NUMBER: US/09/624,693
PRIOR APPLICATION NUMBER: PCT/US01/23270
PRIOR FILING DATE: 2001-07-24
                                                                                                                                                                                                                                                                                                                                                                                                         RESULT 2
US-09-939-408A-21
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              β
δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          멼
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           당
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              D
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          S
                                                                                                        SOFTWARE: PatentIn Ver.
SEQ ID NO 21
LENGTH: 726
TYPE: PRT
 FEATURE:
NAME/KEY: SITE
LOCATION: (12)..(719)
COTHER INFORMATION: "Xaa"means any amino acid; "Xaa"means no consensus
OTHER INFORMATION: Description of Artificial Sequence: Consensus of
OTHER INFORMATION: SEQ ID NOs: 13, 17, and 19
                                                                                        ORGANISM: Artificial
                                                                                                                                                                                                                                                                                                                                                                                                                                                                       661
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                661
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                601
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            601
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   481
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          541
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     541
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                481
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            421
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         421
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                    AYASELGHLANPUTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQAV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            SAVSISMEKTRLALIALIGKLNFTQCTELLNAAMNRGLPSCLAAEDPSLNYHGKGLDIHIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         AFSYATGTVVELLSSSPSANVTLTAVNAMKVASAEKAISLTREVRNRFWQTPSSQAPAHA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            DLRAMELDFKKQFDPLLPTLLQQHLGTGLDVNALALEVKKALNKRLEQTTTYDLEPRWHD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     EGILRODRYPLRTSPOFIGPLVEDMMHAYSTLSLENNTTTDNPLLDVENKQTAHGGNFQA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       EGILRQDRYPLRTSPQFLGPLVEDMMHAYSTLSLENWTTTDNPLLDVENKQTAHGGNFQA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     SLTRGHSAVRLVVLEALTNFLNHRITFIVPLRGSISASGDLSPLSYIAGAITGHPDVKVH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 GFGGSADTRTEDAVSLQKALIEHQLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIRVN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GFGGSADTRTEDAVSLOKALIEHOLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIRVN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       AFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAISLTREVRNRFWQTPSSQAPAHA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       DLRAMELDFKKQFDPLLPTLLQQHLGTGLDVNALALEVKKALNKRLEQTTTYDLEPRWHD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            SAVSISMEKTRLALIGKLNFTQCTELLNAAMNRGLPSCLAAEDPSLNYHGKGLDIHIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                ALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEVKVXDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      SLTRGHSAVRLVVLEALTNFLNHRITPIVPLRGSISASGDLSPLSYIAGAITGHPDVKVH
                                                                                      Sequence
                                                                                                                                                      2.0
                                                                                                                                                                                                                                                                                                      and
                                                                                                                                                                                                                                                                                                    Polypeptide and Methods of
                                                                                                                                                                                                                                                                                                                    and
                                                                                                                                                                                                                                                                                                    Obtaining
                                 at
                                                                                                                                                                                                                                                                                                    and
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            660
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                         720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                660
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          600
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     600
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 180
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            180
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          120
                              posi
                                                                                                                                               RESULT 3
US-09-939-408A-30
; Sequence 30, Application US
; Patent No. US200220102712A1
                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                                                         Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                8
                                                                                                                                                                                                                                                                      S
                                                                                                                                                                                                                                                                                                    맒
                                                                                                                                                                                                                                                                                                                          δ
                                                                                                                                                                                                                                                                                                                                                                                                                         日
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           뭐
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   γQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        US-09-939-408A-21
GENERAL INFORMATION:

APPLICANT: Yoshida, Roberta
APPLICANT: Yoshida, Roberta
APPLICANT: Kootstra, Anna
TITLE OF INVENTION: Phenylalanine Ammonia Lyase Polypeptide and
TITLE OF INVENTION: Polynucleotide Sequences and Methods of Obt
TITLE OF INVENTION: Using Same
FILE REFERENCE: 29479/500NSCA
CURRENT APPLICATION UNMBER: US/09/939,408A
CURRENT FILING DATE: 2001-08-24
PRIOR APPLICATION NUMBER: US 09/624,693
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Query Match
Best Local Similarity
Matches 564; Conserv
                                                                                                                                                                                                                                                                        715
                                                                                                                                                                                                                                                                                                      661
                                                                                                                                                                                                                                                                                                                                  655
                                                                                                                                                                                                                                                                                                                                                                601
                                                                                                                                                                                                                                                                                                                                                                                              595
                                                                                                                                                                                                                                                                                                                                                                                                                           541
                                                                                                                                                                                                                                                                                                                                                                                                                                                       539
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    481
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  479
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                421
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           419
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 180
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                121
                                                                                                                                                                                                                                             721
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              120
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      61
                                                                                                                                                                                                                                                                LVKMLA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  IAAYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             DEGILRQDRYPLRTSPQFLGPLVEDWMHAYSTLSLE-UNTTTDNPLLDVENKQTAHGGNF
                                                                                                                                                                                                                                             LVKMLA
                                                                                                                                                                                                                                                                                                      SSPALXYLSPRTRVLYSFVREELGVKARRGDVFLGKQEVTIGSNVSRIYEAIKSGRINXV
                                                                                                                                                                                                                                                                                                                                                               EPRWHDAFSXATGTVVEXLSSXXXXXVSLAAVNAWKVAXAEKAISLTRXVRXXFWXAPSS
                                                                                                                                                                                                                                                                                                                                                                                      EPRWHDAFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAISLTREVRNRFWQTPSS
                                                                                                                                                                                                                                                                                                                                                                                                                                              AVDLRAMELDFKKQFDPLLPTLLQQHLGTGLDVNA----LALEVKKALNKRLEQTTTYDL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                QASAVSISMEKTRLALALIGKLNFTQCTELLNAAMNRGLPSCLAAEDPSLNYHGKGLDIH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 QALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEVKVKD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              HVXHEGXEKIMXAREAIALFGLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            HVLHEGTEKIMFAREAISLFGLEAVVLGPKEGLGLVNGTAVSASMATLSLHDSHMLSLLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   NSLTRGHSAVRLVVLEALTNFLNHRITEIVPLRGSISASGDLSPLSYIAGAITGHPDVKV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                TGFGGSADTRTEDAISLQKALLEHQLCGVLPTSXDSFXLGRGLENSLPLEVVRGAMTIRV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               TGFGGSADTRTEDAVSLQKALIEHQLCGVTPTSXSSESVGRGLENTLPLEVVRGAMVIRV 179
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          PXTDDXXELDGYSLTLGDVVGAARKGRXVRVXDSDEIRXKIDKSVEFLRXQLXNSVYGVT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  P-TDDVVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSVYGVT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     MAPSIDSTATSXANGXXNGXHAAXXASXXXXXXXXXXAXAGSXLPTTXXTQLDIVEXXLAD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      MAPSIDSIATTIANGFINGSHAAPTKSAAGPTSAIRRTPGIDGHAAHQSQIBIVQBIISD
                                                                                                                                                                                                                                                                                                                       QAPAHAYLSPRTRVLYSFVREELGVQARRGDVFVGVQQETIGSNVSRIYEAIKDGRINHV
                                                                                                                                                                                                                                                                                                                                                                                                                         AVDLRAMEFEFKKÖFXPXXXXLLXÖHFGXXXTXXXXXXELXXKVXKXLXKRLEQTNSYDL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                QASAVXNTMEKTRLALALIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       DEGILRODRYPLRTSPOWLGPLVSDMIHAHAVLSLEAGQSTTDNPLIDVENKXTHHGGNF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                QALTALTVEAMVGHAGSFHPFLHDVTRPHPTQIEVARNIRTLLEGSXFAVHHEEEVKVKD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Conservative
                                                                                                                                                                                                                                             726
                                                                                                                                                                                                                                                                         720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             76.7%; Score 2770; DB 9; 77.7%; Pred. No. 5.8e-243; tive 40; Mismatches 116;
                                                                                                                                                                    US/09939408A
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Length 726;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Indels
                                                                             Obtaining
                                                                             and
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            478
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                359
                                                                                                                                                                                                                                                                                                                                                                                                                                                         594
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   538
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     418
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      119
                                                                                                                                                                                                                                                                                                                                  714
                                                                                                                                                                                                                                                                                                                                                                  660
                                                                                                                                                                                                                                                                                                                                                                                              654
                                                                                                                                                                                                                                                                                                                                                                                                                            600
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          299
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   239
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                180
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     9
```

```
PRIOR FILING DATE: 2000-07-24
PRIOR APPLICATION NUMBER: PCT/US01/23270
PRIOR FILING DATE: 2001-07-24
NUMBER OF SEQ ID NOS: 30
SOFTWARE: PatentIn Ver. 2.0
SEQ ID NO 30
LENGTH: 720
                    NAME/KEY misc feature LOCATION: (54)...(54) OTHER INFORMATION: The NAME/KEY misc feature LOCATION: (56)...(56) OTHER INFORMATION: The NAME/KEY misc feature LOCATION: (65)...(65) OTHER INFORMATION: The NAME/KEY misc feature LOCATION: (66)...(66) OTHER INFORMATION: The NAME/KEY misc feature LOCATION: (76)...(76) OTHER INFORMATION: The NAME/KEY misc feature LOCATION: (76)...(76)
                                                                                                                                                                                                                   NAME/KEY: misc feature LOCATION: (28). (28) OTHER INFORMATION: The NAME/KEY: misc feature LOCATION: The COMME/KEY: misc feature LOCATION: (34) OTHER INFORMATION: The NAME/KEY: misc feature LOCATION: (36). (36) OTHER INFORMATION: The NAME/KEY: misc feature LOCATION: (39). (39) OTHER INFORMATION: The NAME/KEY: misc feature LOCATION: (40). (40) OTHER INFORMATION: The NAME/KEY: misc feature LOCATION: (40). (40) OTHER INFORMATION: The NAME/KEY: misc feature LOCATION: (48). (48) OTHER INFORMATION: The NAME/KEY: misc feature LOCATION: (48). (48)
                                                                                                                                                                                                                                                                                                                                                                                                                                          LOCATION: (20) ... (20)
OTHER INFORMATION: The '
NAME/KEY: misc_feature
LOCATION: (25) ... (25)
OTHER INFORMATION: The '
NAME/KEY: misc_feature
LOCATION: (27) ... (27)
OTHER INFORMATION: The '
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    LOCATION: (19)..(19)
OTHER INFORMATION: The
NAME/KEY: misc_feature
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         LOCATION: (17)...(17)
OTHER INFORMATION: The
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            NAME/KEY: misc_feature
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   FEATURE:
OTHER INFORMATION: Description of Artificial Sequence:
OTHER INFORMATION: theoretical sequence based in part on
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              OTHER INFORMATION: The
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 NAME/KEY: misc_feature
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            NAME/KEY: misc_feature LOCATION: (12)..(12)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               NAME/KEY: misc_feature
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         TYPE: PRT
ORGANISM: Artificial Sequence
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          WAME/KEY: misc_feature
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  OTHER INFORMATION:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   OTHER INFORMATION: The 'Xaa' at
          . (87)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         . (16)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  The
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 'Xaa' at
                                   'Xaa'
                                                                       'Xaa'
                                                                                                                                              'Xaa'
                                                                                                                                                                                 'Xaa'
                                                                                                                                                                                                                     'Xaa'
                                                                                                                                                                                                                                                         'Xaa' at
                                                                                                                                                                                                                                                                                              'Xaaʻ
                                                                                                                                                                                                                                                                                                                                  'Xaa'
                                                                                                                                                                                                                                                                                                                                                                      'Xaa' at location 34
                                                                                                                                                                                                                                                                                                                                                                                                       'Xaa'
                                                                                                                                                                                                                                                                                                                                                                                                                                             'Xaa'
                                                                                                                                                                                                                                                                                                                                                                                                                                                                               'Xaa'
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   'Xaa'
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      'Xaa'
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          'Xaa'
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             'Xaa'
'Xaa'
                                                                                                          'Xaa'
                                                                                                         at
                                                                                                                                                                                                                     at
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              at
                                                                      at
                                                                                                                                                                                                                                                                                              at
                                                                                                                                                                                                                                                                                                                                 at
                                                                                                                                                                                                                                                                                                                                                                                                       at
                                                                                                                                                                                                                                                                                                                                                                                                                                             at
                                                                                                                                                                                                                                                                                                                                                                                                                                                                              at
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   a
t
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      àt
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          at
at
                                   at
                                                                                                                                              at
                                                                                                                                                                                 at
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              location 16
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  location 5 stands for Val,
                                                                                                          location 65
                                                                                                                                                                                                                     location 48
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               location 12 stands
                                                                       location
                                                                                                                                                                                                                                                       location 40
                                                                                                                                                                                                                                                                                              location
                                                                                                                                                                                                                                                                                                                                 location 36
                                                                                                                                                                                                                                                                                                                                                                                                       location 28
                                                                                                                                                                                                                                                                                                                                                                                                                                             location
                                                                                                                                                                                                                                                                                                                                                                                                                                                                               location
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   location
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          location 17
location
                                   location
                                                                                                                                                                                 location
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      location
                                                                                                                                              location
87
                                                                      ტ
ტ
                                                                                                                                                                                                                                                                                              39
                                                                                                                                                                                                                                                                                                                                                                                                                                                                               25
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   20
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       19
                                   76
                                                                                                                                              56
                                                                                                                                                                                 5
4
                                                                                                                                                                                                                                                                                                                                                                                                                                             27
stands
                                   stands
                                                                      stands
                                                                                                         stands
                                                                                                                                              stands
                                                                                                                                                                                 stands
                                                                                                                                                                                                                     stands
                                                                                                                                                                                                                                                         stands
                                                                                                                                                                                                                                                                                              stands
                                                                                                                                                                                                                                                                                                                                 stands
                                                                                                                                                                                                                                                                                                                                                                     stands
                                                                                                                                                                                                                                                                                                                                                                                                       stands
                                                                                                                                                                                                                                                                                                                                                                                                                                             stands
                                                                                                                                                                                                                                                                                                                                                                                                                                                                               stands
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   stands
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     stands
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          stands
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              stands
                                                                                                                                                                                                                                                                                             for
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 for a
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          for
                                   for
                                                                      for
                                                                                                          for
                                                                                                                                                                                 for
                                                                                                                                                                                                                     for Lys,
                                                                                                                                                                                                                                                         for
                                                                                                                                                                                                                                                                                                                               for Arg,
                                                                                                                                                                                                                                                                                                                                                                      for
                                                                                                                                                                                                                                                                                                                                                                                                       for
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             for Val,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               for Val,
for Thr,
                                                                                                                                              for Lys,
                                                                                                                                                                                                                                                                                                                                                                                                                                             for
                                                                                                                                                                                                                                                                                                                                                                                                                                                                               for
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      for
                                                                      Ile,
                                                                                                                                                                                                                                                      Arg,
                                                                                                                                                                                                                                                                                                                                                                                                       Ala,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Thr,
                                                                                                          Glu,
                                                                                                                                                                                                                                                                                                                                                                                                                                          Pro,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Gly.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Thr,
                                  Gly
                                                                                                                                                                                 Val
                                                                                                                                                                                                                                                                                              Ala,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  stop
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Preferred
SEQ ID NO:20
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Leu,
Pro,
                                                                                                                                              Glu,
                                                                                                                                                                                                                                                                                             Pro,
                                                                                                                                                                                                                                                                                                                                 ဝူ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Leu,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Leu,
                                                                      Val,
                                                                                                         Asp,
                                                                                                                                                                                                                                                                                                                                                                                                         ç
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ala,
                                                                                                                                                                                                                     Thr, Met, Glu,
                                                                                                                                                                                                                                                         Gly, or Trp
                                                                                                                                                                                                                                                                                                                                                                                                                                             ဝူ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Pro, or Ser
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   codon,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   or Phe
                                                                                                                                                                                                                                                                                              or Ser
o
R
                                                                       or Leu.
                                                                                                         or
                                                                                                                                              or Gln
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          유
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             or
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 or Phe
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Phe.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ser,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   9
                                                                                                                                                                                                                     Ala,
```

```
IOCATION: (259)....
OTHER INFORMATION: The 'OTHER INFORMATION: The 'OTHER INFORMATION: (305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)...(305)..
                                                                                                                                  OTHER INFORMATION: The 'NAME/KBY: misc feature LOCATION: (251) ...(251)
                                                                                                                                                                                                                                                                                                                                                                                 LOCATION: (237)...(237)
OTHER INFORMATION: The 'OTHER INFORMATION: Cys,
NAME/KEY: misc feature
LOCATION: (239)...(239)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             OTHER INFORMATION: The NAME/KEY: misc feature LOCATION: (114) ...(114)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               OTHER INFORMATION: The NAME/KEY: misc feature
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                LOCATION: (93)..(93)

OTHER INFORMATION: The

NAME/KEY: misc feature

(102)
                                                                                          LOCATION: (251)...(251)
OTHER INFORMATION: The
NAME/KEY: misc_feature
LOCATION: (259)...(259)
                                                                                                                                                                                                                                                                                                                                           LOCATION: (239)..(239)
OTHER INFORMATION: The
NAME/KEY: misc_feature
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      OTHER INFORMATION: The NAME/KEY: misc feature LOCATION: (154)...(154) OTHER INFORMATION: The
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               OTHER INFORMATION: The NAME/KEY: misc feature LOCATION: (153) . (153)
                                                                                                                                                                                                                                                                                                       LOCATION: (241)..(241)
OTHER INFORMATION: The
                                                                                                                                                                                                                                                                                                                                                                                                                                                                         LOCATION: (225)..(225)
OTHER INFORMATION: The
NAME/KEY: misc feature
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        NAME/KEY: misc feature LOCATION: (159)..(159)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     LOCATION: (117)..(117)
OTHER INFORMATION: The
                                                                                                                                                                                                            NAME/KEY: misc_feature
LOCATION: (246)..(246)
                                                                                                                                                                                                                                                LOCATION: (242)..(242)
OTHER INFORMATION: The
                                                                                                                                                                                                                                                                    NAME/KEY: misc_feature
LOCATION: (242)..(242)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   NAME/KEY: misc_feature
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     LOCATION: (223)..(223)
OTHER INFORMATION: The
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            NAME/KEY: misc_feature
LOCATION: (223)..(223)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  LOCATION: (183)..(183)
OTHER INFORMATION: The
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    NAME/KEY: misc_feature
LOCATION: (183)..(183)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          OTHER INFORMATION: The
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                LOCATION: (157)..(157)
OTHER INFORMATION: The
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      NAME/KEY: misc_feature
LOCATION: (157)..(157)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     NAME/KEY: misc_feature
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        NAME/KEY: misc_feature
LOCATION: (112)..(112)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CCATION: (109)..(109)
OTHER INFORMATION: The
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              NAME/KEY: misc feature LOCATION: (109)...(109)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                LOCATION: (103)..(103)
OTHER INFORMATION: The
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    NAME/KEY: misc_feature
LOCATION: (103)..(103)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        LOCATION: (102)..(102)
OTHER INFORMATION: The
COCATION: (305)...(305)
OTHER INFORMATION: The VAME/KEY: misc_feature
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         NAME/KEY: misc_feature
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    OCATION:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           OCATION:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         .. (150)
                                                                                                                                                                                                                                                                                                                                                                 'Xaa'
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                'Xaa'
                  'Xaa'
                                                                                                                                  'Xaa'
                                                                                                                                                                                                                                                  'Xaa'
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        'Xaa'
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       'Xaa'
                                                                          'Xaa'
                                                                                                                                                                                          'Xaa'
                                                                                                                                                                                                                                                                                                         'Xaa'
                                                                                                                                                                                                                                                                                                                                                                                                                                           'Xaa'
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   'Xaa'
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            'Xaa'
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    'Xaa'
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          'Xaa'
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  'Xaa'
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 'Xaa'
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       'Xaa'
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             'Xaa'
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    'Xaa'
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            'Xaa'
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  'Xaa'
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          'Xaa'
                                                                                                                                                                                                                                                                                                                                                                                                                       ç
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               'Xaa'
                                                                                                                                                                                                                                                                                                                                                                                                                       a' at
Phe.
                                                                                                                                                                                                                                                                                                                                                                 at location
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   at
                  at
                                                                          at
                                                                                                                                at
                                                                                                                                                                                        at
                                                                                                                                                                                                                                                  at
                                                                                                                                                                                                                                                                                                         at
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            at location
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  at location 157 stands for Ser,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        at location 154 stands
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       at
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  at
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  ct
Di
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                at location
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    at location 183
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          at location 159
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 at location
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       at location
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               at location 148
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             at location 114
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            at location 109
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        at location 102
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   location
                                                                                                                                                                                        location
                                                                                                                                                                                                                                                                                                       location
                  location
                                                                                                                                                                                                                                                  location
                                                                          location
                                                                                                                                  location
                                                                                                                                                                                                                                                                                                                                                                                                                                           location
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       location
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    location
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  location
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 153
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  112
                                                                                                                                                                                                                                                                                                       241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            223
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       150
                  305
                                                                          259
                                                                                                                                251
                                                                                                                                                                                          246
                                                                                                                                                                                                                                                  242
                                                                                                                                                                                                                                                                                                                                                                   239
                                                                                                                                                                                                                                                                                                                                                                                                                                           237
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   225
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       117
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  103
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                93 stands
                                                                                                                                                                                        stands
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 stands
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             stands
                    stands
                                                                          stands
                                                                                                                                  stands
                                                                                                                                                                                                                                                  stands
                                                                                                                                                                                                                                                                                                         stands
                                                                                                                                                                                                                                                                                                                                                                   stands
                                                                                                                                                                                                                                                                                                                                                                                                                                           stands
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   stands
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            stands
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    stands for
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          stands
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       stands
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       stands
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             stands
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    stands
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            stands for
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  stands
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          stands for
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                for
                                                                          for
                                                                                                                                                                                          for
                                                                                                                                                                                                                                                  for
                                                                                                                                                                                                                                                                                                                                                                                                                                           for
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   for
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            for
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          for
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        for
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 for
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       for
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               for
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       for
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             for
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    for
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  for
                    for
                                                                                                                                  for
                                                                                                                                                                                                                                                                                                         for
                                                                                                                                                                                                                                                                                                                                                                   for
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Asp,
                                                                                                                                                                                        Lys,
                                                                                                                                                                                                                                                  Val,
                                                                                                                                                                                                                                                                                                                                                                                                                                           Ser,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ser
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Thr.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Glu,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ile,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Arg,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Thr.
                                                                          Leu,
                                                                                                                                  Tyr,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Gly.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Gly.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Asp,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Arg,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Lys,
                                                                                                                                                                                                                                                                                                         ۷al
                                                                                                                                                                                                                                                                                                                                                                   Val
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Pro
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Pro
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                or Ala.
                                                                                                                                                                                        Asn,
                                                                                                                                                                                                                                                  Leu,
                                                                                                                                  Ser,
                                                                                                                                                                                                                                                                                                                                                                                                                                           Thr,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Gly, or
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        g
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    His,
                                                                          Ö
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Val, or
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             ę
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          õ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ala,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  ဝူ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Asp
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ser
                                                                                                                                                                                                                                                                                                                                                                                                                                           Ile,
                                                                                                                                    or
Or
                                                                                                                                                                                          g
                                                                                                                                                                                                                                                  or Phe
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      o
R
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            õ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Phe.
```

```
밁
                                              Ş
                                                                  В
                                                                                         8
                                                                                                          Д
                                                                                                                               γQ
                                                                                                                                                        g
                                                                                                                                                                          8
                                                                                                                                                                                             망
                                                                                                                                                                                                                  Ş
                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                           Ş
                                                                                                                                                                                                                                                                                    Query Match
Best Local Sim
Matches 551;
                                                                                                                                                                                                                                                                                                                                      OTHER INFORMATION: The NAME/KEY: misc feature LOCATION: (557)...(557) OTHER INFORMATION: The NAME/KEY: misc feature LOCATION: (558)...(558)
                                                                                                                                                                                                                                                                                                                                                                                                NAME/KEY: misc_feature
LOCATION: (536). (536)
OTHER INFORMATION: The
NAME/KEY: misc_feature
LOCATION: (556)..(556)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   NAME/KEY: misc_feature
LOCATION: (466) . (466)
OTHER INFORMATION: The
NAME/KEY: misc_feature
LOCATION: (487) . (487)
OTHER INFORMATION: The
                                                                                                                                                                                                                                                                                                                                                                                                                                                               NAME/KEY: misc_feature
LOCATION: (493) ... (493)
OTHER INFORMATION: The
NAME/KEY: misc_feature
LOCATION: (518) ... (518)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           OTHER INFORMATION: The 'OTHER INFORMATION: stop NAME/KEY: misc_feature LOCATION: (411)...(411)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  NAME/KEY: misc_feature
LOCATION: (458)..(458)
OTHER INFORMATION: The
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  NAME/KEY: misc feature LOCATION: (457)...(457) OTHER INFORMATION: The
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 NAME/KEY: misc_feature
LOCATION: (421)..(421)
OTHER INFORMATION: The
                                                                                                                                                                                                                                                                                                                                                                                                                                            OTHER INFORMATION: The NAME/KEY: misc_feature
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                LOCATION: (411)..(411)
OTHER INFORMATION: The
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   NAME/KEY: misc_feature
LOCATION: (346)..(346)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       OCATION: (319) (319)
OTHER INFORMATION: The
                                                                                                                                                                                                                                                                                                                            INFORMATION: The 'Xaa' at location 558 stands for Thr,
            361
                                                    301
                                                                        241
                                                                                            241
                                                                                                                 181
                                                                                                                                    181
                                                                                                                                                         121
                                 301
                                                                                                                                                                              121
                                                                                                                                                                                                  61
                                                                                                                                                                                                                       61
                                                                                                                                                                                                                                                                1 MAPSIDSLATTIANGETNGSHAAPTKSAAGPTSALRRTPGLDGHAAHQSQLEIVQELLSD
                                                                                                                                                                                                                                                                                              Similarity
                                                                                                                                                                       GFGGSADTRTEDAVSLQKALIEHQLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIRVN
                                                                        XXHEGXEKIMXAREAIALXGLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLSQ
                                                                                   VLHEGTEKIMFAREAISLFGLEAVVLGPKEGLGLVNGTAVSASMATLSLHDSHMLSLLSQ
EGILRODRYFLRTSPQFLGFLVEDMMHAYSTLSLENNTTTDNFLLDVENKQTAHGGNFQA
                                                 ALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEVKVKDD
                                                                                                                 SLXRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSXLXYTAAAITGHPDXKXH
                                                                                                                                    SLTRGHSAVRLVVLEALTNFLNHRITPIVPLRGSISASGDLSPLSYIAGAITGHPDVKVH
                                                                                                                                                         GFGGSADTRTEDAISLQKALLEHQLCGXLXTSXXSFXLXRGLENSLPLEVVRGAMTIRVN
                                                                                                                                                                                                  PTDDXXELDGYTLTLXDVVGAARKGRXVRVQTXDEIRAKIDXXVEFLRXQLXNXVYXVTT
                                                                                                                                                                                                               PTDDVVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSVYGVTT
                                                                                                                                                                                                                                            MAPSXDSIATSXANGXXNXXHAAPXKXXTGATSXLXRPXXLAPPATQXTQLDIXEXILAD
                                 ALTAXTVEAMVGHAGSFHXFLHDVTRPHPTQ1EVARN1RTLLEGSXFAVHHEEEVKVKDD
                                                                                                                                                                                                                                                                                     Conservative
                                                                                                                                                                                                                                                                                              75.6%;
                                                                                                                                                                                                                                                                                                                                                            'Xaa'
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    'Xaa'
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   'Xaa'
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        'Xaa' at location 346
                                                                                                                                                                                                                                                                                                                                                                                                                         'Xaa'
                                                                                                                                                                                                                                                                                                                                                                                                                                                         'Xaa'
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       'Xaa'
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   'Xaa'
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     'Xaa'
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  'Xaa'
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      'Xaa'
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         'Xaa'
                                                                                                                                                                                                                                                                                                                                                                                         'Xaa'
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               codon,
                                                                                                                                                                                                                                                                                   ; Score 2730; DB 9;
; Pred. No. 2.5e-239;
45; Mismatches 124;
                                                                                                                                                                                                                                                                                                                                                            e
Ct
                                                                                                                                                                                                                                                                                                                                                                                          at
                                                                                                                                                                                                                                                                                                                                                                                                                        at
                                                                                                                                                                                                                                                                                                                                                                                                                                                        at
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       at
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      at
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    ât
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   at
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    at
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 at
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 at
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        a
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Trp,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         location
                                                                                                                                                                                                                                                                                                                                                            location
                                                                                                                                                                                                                                                                                                                                                                                          location
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    location
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    location
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 location 411
                                                                                                                                                                                                                                                                                                                                                                                                                        location
                                                                                                                                                                                                                                                                                                                                                                                                                                                         location
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  location
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       location
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   location
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      location
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                or Ser.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         . 319
                                                                                                                                                                                                                                                                                                                                                                                                                        536
                                                                                                                                                                                                                                                                                                                                                            557
                                                                                                                                                                                                                                                                                                                                                                                          556
                                                                                                                                                                                                                                                                                                                                                                                                                                                        518
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       493
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     466
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   458
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     457
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  421
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      487
                                                                                                                                                                                                                                                                                                                                                            stands
                                                                                                                                                                                                                                                                                                                                                                                          stands
                                                                                                                                                                                                                                                                                                                                                                                                                         stands
                                                                                                                                                                                                                                                                                                                                                                                                                                                         stands
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       stands
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      stands
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     stands
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   stands
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     stands
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  stands
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 stands
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          stands
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         stands
                                                                                                                                                                                                                                                                                                       Length 720;
                                                                                                                                                                                                                                                                                     Indels
                                                                                                                                                                                                                                                                                                                                                            for
                                                                                                                                                                                                                                                                                                                                                                                                                        for
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       for
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    for
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    for
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  for
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 for
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         for
                                                                                                                                                                                                                                                                                                                                                                                          for Met,
                                                                                                                                                                                                                                                                                                                                                                                                                                                         for
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      for
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    for
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          for
                                                                                                                                                                                                                                                                                                                                                            Ile,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Val.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Gly.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Thr,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Lys,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Lys,
                                                                                                                                                                                                                                                                                                                                                                                                                         Val
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Pro
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Leu
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Pro.
                                                                                                                                                                                                                                                                                                                             Ala,
                                                                                                                                                                                                                                                                                                                                                            Val,
                                                                                                                                                                                                                                                                                    0;
                                                                                                                                                                                                                                                                                                                                                                                          Ile,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ala,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Thr,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Arg,
                                                                                                                                                                                                                                                                                    Gaps
                                                                                                                                                                                                                                                                                                                                                            압
                                                                                                                                                                                                                                                                                                                             9
                                                                                                                                                                                                                                                                                                                                                                                          Val, or Leu.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  မ္ပ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 9
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Thr,
                                                                                                                                                                                                                                                                                                                                                            Leu.
            420
                                                                                             300
                                                                                                                                    240
                                                                                                                                                                                                  120
                                                                                                                                                                                                                       120
                                                                                                                                                                                                                                            60
                                                                                                                                                                                                                                                                60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Gln,
                                 360
                                                    360
                                                                        300
                                                                                                                 240
                                                                                                                                                         180
                                                                                                                                                                              180
                                                                                                                                                                                                                                                                                     0
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Pro,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          a
            B
                              ő
                                                                   δ
                                                                                            В
                                                                                                               Š
                                                                                                                                    B
                                                                                                                                                        8
                                                                                                                                                                              밁
                                                                                                                                                                                               Ś
                                                                                                                                                                                                                       맑
                                                                                                                                                                                                                                         Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Ş
                                                    B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            US-09-765-873A-8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     맑
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 뭉
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        멍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                          US-09-765-873A-8
                                                                                                                                                                                                                                                                 Matches 522;
                                                                                                                                                                                                                                                                                     Query Match
                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GENERAL INFORMATION:
                                                                                                                                                                                                                                                                                                                 TYPE: PRT
ORGANISM: Rhodotorula
                                                                                                                                                                                                                                                                                                                                       LENGTH: 716
                                                                                                                                                                                                                                                                           Local
              295
                                                     235
                                                                        241
                                                                                              175
                                                                                                                                     115
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         661
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               601
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    601
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        541
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             541
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  481
                                301
                                                                                                                 181
                                                                                                                                                         121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     661
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     481
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          421
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               421
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  361
                                                                                                                                                                              55
                                                                                                                                                                                                  61
                                                                                                                                                                                                                                                                           Similarity
```

```
AYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQAV
YLSPRTRVLYSFVREELGVKARRGDVFLGKQEVTIGTNVSRIYEAIKXGXINHVLVKMLA
                                                       YLSPRTRVLYSFYREELGYQARRGDVFYGYQQETIGSNYSRIYEAIKDGRINHYLYKMLA
                                                                                                                                                                                   AFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAISLTREVRNRFWQTPSSQAPAHA
                                                                                                                                                                                                                                                 DIRAMEFERKKOFDPXXXXXIXXQHFGXALDGXELXDKVNKXLXKRLEQTNSYDLEPRWHD
                                                                                                                                                                                                                                                                                                         DLRAMELDFKKOFDPLLETLLQQHLGTGLDVNALALEVKKALNKRLEQTTTYDLEPRWHD
                                                                                                                                                                                                                                                                                                                                                                             AYTSELXHLANPXTTHVQPREMGNQAVNSLALISARRXAEANDVLSLLLATHLYCXLQAV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   XAVANTMEKTRLALI GKLNFTQLTEMINAGMNRGXXSCLAAEDXSLSYHCKGLDI AAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          SAVSISMEKTRIALALIGKINFTOCTELLNAAMNRGLPSCLAAEDPSLNYHGKGLDIHIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        EGILRODRYPLRTSPOWLGPLVSDMIHAHAVLSLEAESTTDNPLIDVENKXTHHGGNFQA
                                                                                                                            AFSFATGTVVELLSSSXXAKVSLAAVNAWKVASAEKAISLTRXVRDXFWXAPSSSSPALX
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            42C
      720
                                                              720
                                                                                                                               660
                                                                                                                                                                                          660
                                                                                                                                                                                                                                                    600
                                                                                                                                                                                                                                                                                                               600
                                                                                                                                                                                                                                                                                                                                                                                                                                        540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 480
```

S-09-765-873A-8
Sequence 8, Application US/09765873A
Patent No. US20010053847A1
GENERAL INFORMATION:
APPLICANT: Tang, Xiao-Song
APPLICANT: Tang, Xiao-Song
TITLE OF INVENTION: BIOPRODUCTION OF PARA-HYDROXYCINNAMIC.
FILE REFERENCE: BC1009 US CIP
CURRENT APPLICATION NUMBER: US/09/765,873A
CURRENT FILING DATE: 2001-01-19
PRIOR APPLICATION NUMBER: US 09/627,216
PRIOR FILING DATE: 2000-07-27
PRIOR APPLICATION NUMBER: US 60/147,719
PRIOR APPLICATION NUMBER: US 60/147,719
PRIOR APPLICATION SIBER OF SEQ ID NO.8
SOFTWARE: Microsoft Office 97
SEQ ID NO.8
SOFTWARE: Microsoft Office 97
CEGANISM: Rhodotorula glutinis
S-09-765-873A-8

1 MAPSIDSLATTLANGFTNGSHAAPTKSAAGPTSALRRTPGLDGHAAHQSQLEIVQELLSD GFGGSADTRTEDAISLQKALLEHQLCGVLPSSFDSFRLGRGLENSLFLEVVRGAMTIRVN SLTAMTVEAMVGHAGSFHPFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEVKVKDD VLHEGTEKIMFAREAISLFGLEAVVLGPKEGLGLVNGTAVSASMATLSLHDSHMLSLLSQ SLTRGHSAVRLVVLEALTNFLNHRITPIVPLRGSISASGDLSPLSYIAGAITGHPDVKVH GFGGSADTRTEDAVSLQKALIEHQLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIRVN PTDDVVELSGYSLTVRDVVGAARKGRRVRVQUDDEIRARVDKSVDFLKAQLQNSVYGVTT ALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEVKVKDD SLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAISGHPDSKVH PTDSTLELDGYSLNLGDVVSAARKGREVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVTT VVHEGKEKILYAREAMALFNLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLSQ Conservative 72.48; 86; ---VASAKQAVNGASTNLAVAGSHLPTTQVTQVDIVEKMLAA Score 2614; DB 9; Pred. No. 9.5e-229; 6; Mismatches 103; Length Indels 716; 14; Gaps 300 240 54 60 35.6 360 294 234 174 180 114 120

419

```
APPLICANT: Kootstra, Anna
ITITLE OF INVENTION: Phenylalanine Ammonia Lyase Polypeptide and
ITITLE OF INVENTION: Polynucleotide Sequences and Methods of Obtaining and
ITITLE OF INVENTION: Using Same
ITITLE OF INVENTION: Using Same
ITITLE OF INVENTION: Using Same
CURRENT APPLICATION NUMBER: US/09/939,408A
CURRENT FILING DATE: 2001-08-24
PRIOR APPLICATION NUMBER: US 09/624,693
PRIOR FILING DATE: 2000-07-24
PRIOR APPLICATION NUMBER: PCT/US01/23270
PRIOR APPLICATION NUMBER: PCT/US01/23270
PRIOR APPLICATION NUMBER: PCT/US01/23270
PRIOR APPLICATION NUMBER: PCT/US01/23270
PRIOR APPLICATION SERIES 30
SOFTWARE: Patentin Ver. 2.0
SOFTWARE: Patentin Ver. 2.0
TYPE: PRI
T
                                                                                                                                                                                                                                                                                                                                                                 8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     RESULT 5
US-09-039-408A-19
Sequence 19, Application US/09939408A
Patent No. US20020102712A1
GENERAL INFORMATION:
APPLICANT: Yoshida, Roberta
APPLICANT: Kootstra, Anna
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             망
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Š
                                                                                                                                                                                                                8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               망
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        멁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Вb
밁
                                                                    δ
                                                                                                                                                망
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          US-09-939-408A-19
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Query Match 72.4%; Score 2614; DB 9; Length 716; Best Local Similarity 72.0%; Pred. No. 9.5e-229; Matches 522; Conservative 86; Mismatches 103; Indels 1
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              ORGANISM: Rhodotorula toruloides
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               652
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           596
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        535
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        475
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    480
                                                                            181
                                                                                                                                                                                                                                121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          712 LKMLA 716
                                                                                                                                                                                                                                                                                                                                                                                 61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  VKMLA 720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | IDLRAIEFEFKKQFGPAIVSLIDQHFGSAMTGSNLRDELVEKVNKTLAKRLEQTNSYDLV 594
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            VDLRAMELDFKKQFDFLLFTLLQQHLG---TGLDV-NALALEVKKALNKRLEQTTTYDLE 595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             SLTRGHSAVRLVVLEALTNFLNHRITPIVPLRGSISASGDLSPLSYIAGAITGHPDVXVH
                                                                                                                                                                                                                                                                                                                                                                         PTDDVVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSVYGVTT 120
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     MAPSIDSLATTLANGFTNGSHAAPTKSAAGPTSALRRTPGLDGHAAHQSQLEIVQELLSD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           SPALSYLSPRTQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNVL 711
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               APAHAYLSPRTRVLYSFVREELGVQARRGDVFVGVQQETIGSNVSRIYEAIKDGRINHVL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    AAYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQA: 539
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     ASAVSISMEKTRIALALIGKLNFTQCTELLNAAMNRGLESCLAAEDPSLNYHGKGLDIHI 479
SLIRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAISGHPDSKVH
                                                                                                                                                        GFGGSADTRTEDAISLOKALLEHOLCGVLPSSFDSFRLGRGLENSLPLEVVRGAMTIRVN
                                                                                                                                                                                                                                GFGGSADTRTEDAVSLQKALIEHQLCGVTFTSXSSFSVGRGLENTLFLEVVRGAMVIRVN 180
                                                                                                                                                                                                                                                                                                         PTDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVTT 114
                                                                                                                                                                                                                                                                                                                                                                                                                                                             MAPSIDSISHSFÄNG-----VÄSAKQÄVNGASTNLAVAGSHLPTTQVTQVDIVEKMLAA 54
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   PRWHDAFSFAAGTVVEVLSST---SLSLAAVNAWKVAAAESAISLTRQVRETFWSAASTS 651
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   PRWHDAFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAISLTREVRNRFWQTPSSQ 655
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    AAYTSELGHLANPVTTHVQPAEMANQAVNSLALISARRTTESNDVLSLLLATHLYCVLQA 534
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             AAAVANTMEKTRIGLAQIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIAA 474
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Indels 14;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     414
    234
                                                                                                                                                            174
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           715
```

```
RESULT 6
US-10-138-970A-4
/ Sequence 4, Application US/10138970A
/ Publication No. US20030079255A1
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ś
                                                          밁
                                                                                       δõ
                                                                                                                                В
                                                                                                                                                                    Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Дb
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          밁
                   Ş
                                                                                                                                                                                                                                                                                   US-10-138-970A-4
                                                                                                                                                                                                                                                                                           GENERAL INFORMATION:

APPLICANT: Sariasiani, Sima
APPLICANT: Tang, Xiao-Song
APPLICANT: Qi, Wei Wei
TITLE OF INVENTION: Methods for the Production of Tyrosine, Cinnamic Acid and Para-
TITLE OF INVENTION: hydroxycinnamic Acid
FILE REFERENCE: CL1777
CURRENT APPLICATION NUMBER: US/10/138,970A
CURRENT FILING DATE: 2002-07-23
NUMBER OF SEQ ID NOS: 24
SOFTWARE: Microsoft Office 97
SEQ ID NO 4
LENGTH: 716
TYPE: PRT
ORGANISM: C. violaceum
                                                                                                                                                                                                         Best Local Sin Matches 522;
                                                                                                                                                                                                                                            Query Match
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              475
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          480 AAYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQA 539
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     415
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             355
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     295
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             235
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         656
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 596
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      535
                   121 GFGGSADTRTEDAVSLQKALIEHQLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIRVN 180
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             712 LKMLA 716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 716 VKMLA 720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      652 SPALSYLSPRIQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNVL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       540 VDLRAMELDFKKQFDPLLPTLLQQHLG---TGLDV-NALALEVKKALNKRLEQTTTYDLE 595
                                                            წ
                                                                                             61
                                                                                                                                                                      1 MAPSIDSLATTLANGFTNGSHAAPTKSAAGPTSALRRTPGLDGHAAHQSQLEIVQBLLSD
                                                                                                                                                                                                       h 72.4%; Score 2614; DB 14;
Similarity 72.0%; Pred. No. 9.5e-229;
22; Conservative 86; Mismatches 103;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       APAHAYLSPRTRVLYSFVREELGVQARRGDVFVGVQQETIGSNVSRIYEAIKDGRINHVL 715
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              PRWHDAFSFAAGTVVEVLSST---SLSLAAVNAWKVAAAESAISLTRQVRETFWSAASTS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               PRWHDAFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAISLTREVRNRFWQTPSSQ 655
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            AAYTSELGHLANPVTTHVQPAEMANQAVNSLALISARRTTESNDVLSLLLATHLYCVLQA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     AAAVANTMEKTRIGIAQIGKINFTQITEMINAGMNRGIPSCLAAEDPSISYHCKGIDIAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  EGILRQDRYPLRTSPQFLGPLVEDMMHAYSTLSLE-NNTTTDNPLLDVENKQTAHGGNFQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        ALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEVKVKDD 360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   VLHEGTEKIMFAREAISLFGLEAVVLGPKEGLGLVNGTAVSASMATLSLHDSHMLSLLSQ 300
                                                        PTDDVVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSVYGVTT 120
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    IDLRAIEFEFKKOFGPAIVSLIDOHFGSAMTGSNIRDELVEKVNKTLAKRLEOTNSYDLV 594
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        ASAVSISMEKTRLALALIGKLNFTQCTELLNAAMNRGLPSCLAAEDPSLNYHGKGLDIHI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   SLTAMTVEAMVGHAGSFHPFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEVKVKDD
                                                                                                                                  MAPSIDSISHSFANG-----VASAKQAVNGASTNIAVAGSHIPTTQVTQVDIVEKMIAA 54
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           EGILRODRYPLRTSPQWLGPLVSDLIHAHAVLTIEAGQSTTDNPLIDVENKTSHHGGNFQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               VVHEGKEKILYAREAMALFNLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLSQ
Length
                                                                                                                                                                                                           Indels
                                                                                                                                                                                                           14;
                                                                                                                                                                                                         Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              651
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            479
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        711
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         474
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    419
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                534
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 414
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       354
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 294
                                                                                                                                                                         9
```

```
APPLICANT: TAIR; XISO-SONG
TITLE OF INVENTION: BIOPRODUCTION OF PARA-HYDROXYCINNAMIC ACID
FILE REFERENCE: BC1009 US DIVCIP
CURRENT APPLICATION NUMBER: US/10/188,523B
CURRENT FILING DATE: 2002-10-17
PRIOR APPLICATION NUMBER: US 09/627,216
PRIOR FILING DATE: 2000-07-27
PRIOR APPLICATION NUMBER: US 60/147,719
PRIOR APPLICATION NUMBER: US 60/147,719
PRIOR APPLICATION NUMBER: US 60/147,719
PRIOR FILING DATE: 1999-08-06
NUMBER OF SEQ ID NOS: 38
SOFTWARE: Microsoft Office 97
SEQ ID NO 8
LENGTH: 716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  RESULT 7
US-10-188-523B-8
                                                                                                                                                         US-10-188-523B-8
                                                                                   Query Match
Best Local S
Matches 522
                                                                                                                                                                                                                                                                                                                                                                                                                                Sequence 8, Application US/10188523B Publication No. US20030170834A1 GENERAL INFORMATION:
                                                                                                                                                                      LENGTH: 716
TYPE: PRT
ORGANISM: Rhodotorula
                                                                                   Local Similarity hes 522; Conserv
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                415
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     712
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        652
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         656
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            596
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              535
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            475
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     355
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        295
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         235
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            175
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               115
                                                  μ
                                                MAPSIDSLATTLANGFTNGSHAAPTKSAAGPTSALRRTPGLDGHAAHQSQLEIVQELLSD 60
                  MAPSLDSISHSFANG-
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     LKMLA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        VICMLA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      SPALSYLSPRTQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNVL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       APAHAYLSPRTRVLYSFVREEIGVQARRGDVFVGVQQETIGSNVSRIYEAIKDGRINHVL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         PRWHDAFSFAAGTVVEVLSST---SLSLAAVNAWKVAAAESAISLTRQVRETFWSAASTS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    PRWHDAFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAISLTREVRNRFWQTPSSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 AAYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              AAAVANTMEKTRIGIAQIGKINFTQITEMINAGMNRGIPSCLAAEDPSISYHCKGIDIAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 EGILRODRYPLRTSPOWLGPLVSDLIHAHAVLTIEAGQSTTDNPLIDVENKTSHHGGNFQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       SITRGHSAVRLVVLEALINFLNHGITPIVPLRGTISASGDLSPLSYIAAAISGHPDSKVH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               AAYTSELGHLANPVTTHVQPAEMANQAVNSLALISARRTTESNDVLSLLLATHLYCVLQA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               ASAVSISMEKTRLALALIGKLNFTQCTELLNAAMNRGLPSCLAAEDPSLNYHGKGLDIHI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  EGILRODRYPLRTSPOFLGPLVEDMMHAYSTLSLE-NNTTTDNPLLDVENKOTAHGGNFO
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      SLTAMTVEAMVGHAGSFHPFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       VVHEGKEKILYAREAMALFNLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      VLHEGTEKIMFAREAISLFGLEAVVLGPKEGLGLVNGTAVSASMATLSLHDSHMLSLLSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         SLTRGHSAVRLVVLEALTNFLNHRITPIVPLRGSISASGDLSPLSYIAGAITGHPDVKVH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          IDLRAIEFEFKKQFGPAIVSLIDQHFGSAMTGSNLRDELVEKVNKTLAKRLEQTNSYDLV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               GFGGSADTRTEDAISLQKALLEHQLCGVLPSSFDSFRLGRGLENSLPLEVVRGAMTIRVN
                                                                                     Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        720
                                                                                                   72.4%;
                                                                                                                                                                        glutinis
                                                                                   86;
                                                                                   Score 2614; DB
Pred. No. 9.5e-
86; Mismatches
                  -VASAKQAVNGASTNLAVAGSHLPTTQVTQVDIVEKMLAA
                                                                                   ; DB 14;
9.5e-229;
hes 103;
                                                                                     Indels
                                                                                                                   Length
                                                                                                                       716;
                                                                                   14;
                                                                                   Gaps
                  ເກ
4
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              539
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   479
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                474
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        711
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       715
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           651
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            594
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               534
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   414
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    419
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       294
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        234
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      354
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             174
                                                           APPLICANT: Tang, Xiao-Song
APPLICANT: Milano, Joseph
TITLE OF INVENTION: MTHOD FOR THE RECOMBINA
FILE REFERENCE: CL1794 US NA
CURRENT APPLICATION NUMBER: US/10/374,366
CURRENT FILING DATE: 2003-02-26
PRIOR APPLICATION NUMBER: 60/360,279
PRIOR FILING DATE: 2002-02-26
NUMBER OF SEQ ID NOS: 203
SOFTWARE: PatentIn version 3.2
SEQ ID NO 2
LENGTH: 716
TYPE: PRT
ORGANISM: Rhodosporidium glutinis
US-10-374-366-2
                                                                                                                                                                                                                                                                                                                        RESULT 8
US-10-374-366-2
; Sequence 2, Application US/10374366
; Publication No. US20040014085A1
; GENERAL INFORMATION:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 맑
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      망
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        8
Query Match
Best Local Similarity
Matches 522; Conserv
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   652
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      596
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         535
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            475
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       175
                                                                                                                                                                                                                                                                                                                                                                                                                                                  712 LKMLA 716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                716 VKMLA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              656 APAHAYLSPRTRVLYSFVREELGVQARRGDVFVGVQQETIGSNVSRIYEAIKDGRINHVL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       540 VDLRAMELDEKKQFDPLLPTLLQQHLG---TGLDV-NALALEVKKALNKRLEQTTTYDLE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             415
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                355
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   301 ALTALIVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  235
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 295 SLTAMTVEAMVGHAGSFHPFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           55
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           13
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   SPALSYLSPRTQILYAFVREELGVKARRGDVFLGXQEVTIGSNVSKIYEAIKSGRINNVL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     PRWHDAFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAISLTREVRNRFWQTPSSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         IDLRAIEFEFKKQFGPAIVSLIDQHFGSAMTGSNLRDELVEKVNKTLAKRLEQTNSYDLV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                AAYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           ASAVSISMEKTRLALALIGKLNFTQCTELLNAAMNRGLPSCLAAEDPSLNYHGKGLDIHI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              EGILRODRYPLRTSPOFLGPLVEDMMHAYSTLSLE-NNTTTDNPLLDVENKQTAHGGNFQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  VHEGKEKILYAREAMALFNLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        SLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAISGHPDSKVH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         SLTRGHSAVRLVVLEALTNFLNHRITPIVPLRGSISASGDLSPLSYIAGAITGHPDVKVH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 GFGGSADTRTEDAVSLQKALIEHQLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIRVN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         PTDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          AAYTSELGHLANPVTTHVQPAEMANQAVNSLALISARRTTESNDVLSLLLATHLYCVLQA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            EGILRODRYPLRISPONIGPLVSDLIHAHAVLTIEAGOSTTDNPLIDVENKTSHHÖGNFO
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          GFGGSADTRTEDAISLQKALLEHQLCGVLPSSFDSFRLGRGLENSLPLEVVRGAMTIRVN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             PTDDVVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSVYGVTT
   Conservative
72.4%; Score 2614; DB 15; 72.0%; Pred. No. 9.5e-229; tive 86; Mismatches 103;
                                                                                                                                                                                                                                                                         FOR THE RECOMBINATION
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    -SLSLAAVNAWKVAAAESAISLTRQVRETFWSAASTS
                                                                                                                                                                                                                                                                           OF GENETIC
                              Length
   Indels
                                    716;
                                                                                                                                                                                                                                                                           ELEMENTS
   14;
   Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               479
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   715
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      655
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            534
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             474
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                419
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          174
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        180
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           114
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      651
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         594
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            539
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              414
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 354
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    294
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       234
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   360
   ū
```

Ъ δ 유왕 밁 Ş g Ş 망 ð Д Ş 밁 Ş 밁 Ś

Ş

멍 5

```
RESULT 9
US-10-439-478-2
US-10-439-478-2
; Sequence 2, Application US/10439478
; Publication No. US20040018600A1
; GENERAL INFORMATION:
; APPLICANT: E.I. du Pont de Nemours a:
APPLICANT: Qi, Wei Wei
; APPLICANT: Qi, Wei Wei
; APPLICANT: Sariaslani, Sima
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               뮍
                                                                                                                                                                                                                                                                                                                                                                 Š
                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                 Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     뫄
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   멍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ş
        APPLICANT: Tang, Xao-Song
APPLICANT: Vanelli, Todd
TITLE OF INVENTION: Microbial Conversion of
FILE REFERENCE: CL1912
CURRENT APPLICATION NUMBER: US/10/439,478
CURRENT FILING DATE: 2003-05-16
PRIOR APPLICATION NUMBER: 60/383450
PRIOR FILING DATE: 2002-05-23
NUMBER OF SEQ ID NOS: 18
SOFTWARE: Microsoft Office 97
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       175
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 596
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              475
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        235
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   115
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  121
                                                                                                                                                                                                                                                                                                                                       712
                                                                                                                                                                                                                                                                                                                                                                  716
                                                                                                                                                                                                                                                                                                                                                                                                    652
                                                                                                                                                                                                                                                                                                                                                                                                                                                                   595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             415
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             355
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          295
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    ហ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   GFGGSADTRTEDAVSLQKALIEHQLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIRVN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             MAPSLDSISHSFANG-----VASAKQAVNGASTNLAVAGSHLPTTQVTQVDIVEKMLAA
                                                                                                                                                                                                                                                                                                                                                                                                    SPALSYLSPRIQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNVL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 AAYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               EGILRQDRYPLRTSPQFLGPLVEDMMHAYSTLSLE-UNTTTDNPLLDVENKQTAHGGNFQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           MAPSIDSLATTLANGFTNGSHAAPTKSAAGPTSALRRTPGLDGHAAHQSQLEIVQELLSD
                                                                                                                                                                                                                                                                                                                                                                      VKMLA 720
                                                                                                                                                                                                                                                                                                                                                                                                                                   APAHAYLSPRTRVLYSFVREELGVQARRGDVFVGVQQETIGSNVSRIYEAIKDGRINHVL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       PRWHDAPSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAISLTREVRNRFWQTPSSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 IDLRAIEFEFKKQFGPAIVSLIDQHFGSAMTGSNLRDELVEKVNKTLAKRLEQTNSYDLV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    VDLRAMELDFKKQFDPLLFTLLQQHLG---TGLDV-NALALEVKKALNKRLEQTTTYDLE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              AAYTSELGHLANPVTTHVQPAEMANQAVNSLALISARRTTESNDVLSLLLATHLYCVLQA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             ASAVSISMEKTRLALALIGKLNFTQCTELLNAAMNRGLPSCLAAEDPSLNYHGKGLDIHI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           SLTAMTVEAMVGHAGSFHFFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      ALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          VVHEGKEKILYAREAMALFNLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       SLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAISGHPDSKVH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   SLTRGHSAVRLVVLEALTNFLNHRITPIVPLRGSISASGDLSPLSYIAGAITGHPDVKVH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   GFGGSADTRTEDAISLQKALLEHQLCGVLPSSFDSFRLGRGLENSLPLEVVRGAMTIRVN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    PTDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                    PRWHDAFSFAAGTVVEVLSST---SLSLAAVNAWKVAAAESAISLTROVRETFWSAASTS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             EGILRÓDRYPLRTSPÓWLGPLVSDLIHAHAVLTIEAGQSTTDNPLIDVENKTSHHGGNFQ
                                                                                                             of.
                                                                                                            Glucose to Para-Hydroxystyrene
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   655
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                474
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              479
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  υ
4,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                534
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              539
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             419
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    180
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    114
                                                                                                                                                                                                                                                                                                                                                                                                                                      715
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   594
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              414
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          294
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       234
                                                                                                                                                                                                                                                                                                                                                                                                        711
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 595
```

```
밁
                                                                                                                                                                                                                                                                                    5
                                                                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                                                                      Ş
                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                      Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                           B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             US-10-439-478-2
                                                                                                                                                                                                                          Ś
                                                                                                                              US-09-765-873A-35
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Query Match
Best Local S
Matches 522
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         SEQ ID NO 2
LENGTH: 716
TYPE: PRI
ORGANISM: Rhodotorula glutinis
Sequence 35, Application US/09765873A

Patent No. US20010053847A1

GENERAL INFORMATION:
APPLICANT: Tang, Xiao-Song
TITLE OF INVENTION: BIOPRODUCTION OF PARA-HYDROXYCINNAMIC ACID
FILE REFERENCE: BC1009 US CIP
CURRENT APPLICATION UNMBER: US/09/765,873A
CURRENT FILING DATE: 2001-01-19
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Local Similarity 72.0
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        355
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     175
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  181
                                                                                                                                                                                                                                                                                                                             595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        415
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   121
                                                                                                                                                                                                                             716
                                                                                                                                                                                                                                                               652
                                                                                                                                                                                                                                                                                            656
                                                                                                                                                                                                712 LKMLA 716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  61
                                                                                                                                                                                                                             VKMLA 720
                                                                                                                                                                                                                                                                                    APAHAYLSPRTRVLYSFVREELGVQARBGDVFVGVQQETIGSNVSRIYEAIKDGRINHVL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  ASAVSISMEKTRLALIGKLNFTQCTELLNAAMNRGLPSCLAAEDPSLNYHGKGLDIHI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         EGILRODRYPLRTSPOFLGELVEDMMHAYSTLSLE-NNTTTDNFLLDVENKOTAHGGNFO
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                ALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         SLTRGHSAVRLVVLEALTNFLNHRITFIVFLRGSISASGDLSFLSYIAGAITGHFDVKVH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GFGGSADTRTEDAVSLQKALIEHQLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIRVN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        PTDDVVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSVYGVTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  MAPSLDSISHSFANG-----VASAKQAVNGASTNLAVAGSHLPTTQVTQVDIVEKMLAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              MAPSIDSIATTLANGFTNGSHAAPTKSAAGPTSALRRTPGIDGHAAHQSQLEIYQELLSD
                                                                                                                                                                                                                                                               SPALSYLSPRIQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNVL
                                                                                                                                                                                                                                                                                                                                                                                                                         VDLRAMELDFKKOFDPLLPTLLQQHLG---TGLDV-NALALEVKKALNKRLEQTTTYDLE
                                                                                                                                                                                                                                                                                                                                                                                                                                                         AAYTSELGHLANDVTTHVQDAEMANQAVNSLALISARRTTESNDVLSLLLATHLYCVLQA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       SLTAMTVEAMVGHAGSFHPFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      VVHEGKEKILYAREAMALFNLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     SLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAISGHPDSKVH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    GFGGSADTRTEDAISLQKALLEHQLCGVLPSSFDSFRLGRGLENSLPLEVVRGAMTIRVN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                PTDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVTT
                                                                                                                                                                                                                                                                                                                                                                                            IDLRATEFEFKKOFGPATVSLIDOHFGSAMTGSNLRDELVEKVNKTLAKRLEOTNSYDLV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                AAYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        AAAVANTMEKTRIGIAQIGKINFTQITEMINAGMNRGIPSCIAAEDPSISYHCKGIDIAA
                                                                                                                                                                                                                                                                                                                             PRWHDAFSFAAGTVVEVLSST---SLSLAAVNAWKVAAAESAI
                                                                                                                                                                                                                                                                                                                                                        PRWHDAFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAISLTREVRNRFWQTPSSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        EGILRODRYPLRTSPOWLGPLVSDLIHAHAVLTIEAGOSTTDNPLIDVENKTSHHGGNFO
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            72.4%; Score 2614; DB 15; 72.0%; Pred. No. 9.5e-229; 72.0% Pred. No. 9.5e-219; 10.3;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 14;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          419
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            479
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      180
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   114
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  120
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  54
                                                                                                                                                                                                                                                                                                                                                               655
                                                                                                                                                                                                                                                                                                                                                                                                                              595
                                                                                                                                                                                                                                                                                                                                                                                                                                                              534
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            474
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           414
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        294
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      174
                                                                                                                                                                                                                                                                     711
                                                                                                                                                                                                                                                                                                                                651
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             539
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          354
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        234
```

and

Para

```
PRIOR APPLICATION NUMBER: US 09/627,216
PRIOR FILING DATE: 2000-07-27
PRIOR APPLICATION NUMBER: US 60/147,719
PRIOR FILING DATE: 1999-08-06
NUMBER OF SEQ ID NOS: 38
SOFTWARE: Microsoft Office 97
SEQ ID NO 35
LENGTH: 716
TYPE: PRT
ORGANISM: mutant from Rhodotorula glutini
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ; OTHER INFORMATION: X= Thr, US-09-765-873A-35
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Query Match
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           FEATURE:
NAME/KEY: UNSURE
LOCATION: (198)...(198)
OTHER INFORMATION: X=
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       NAME/KEY: UNSURE
LOCATION: (540)..(540)
                  716
                                                      652
                                                                                                                            595
                                                                                                                                                            596
                                                                                                                                                                                                535
                                                                                      959
                                                                                                                                                                                                                                                                     475
                                                                                                                                                                                                                                                                                                     480
                                                                                                                                                                                                                                                                                                                                         415
                                                                                                                                                                                                                                  540
                                                                                                                                                                                                                                                                                                                                                                         420
                                                                                                                                                                                                                                                                                                                                                                                                             355
                                                                                                                                                                                                                                                                                                                                                                                                                                               361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   295
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        235
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              175
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    115
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   522;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        ហ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            н
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1 MAPSIDSLATTLANGETNGSHAAPTKSAAGPTSALRRTPGIDGHAAHQSQLEIVQELLSD
:|||A
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Similarity
                                                VDLRAMELDFKKQFDPLLPTLLQQHLG---TGLDV-NALALEVKXALNKRLEQTTTYDLE
                                                                                                                                                                                                                                                                                                                                                            ASAVSISMEKTRLALALIGKLNFTQCTELLNAAMNRGLPSCLAAEDPSLNYHGKGLDIHI 479
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            GFGGSADTRTEDAVSLQKALIEHQLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIRVN
                                                                                                                        PRWHDAFSFAAGTVVEVLSST---SLSLAAVNAWKVAAAESAISLTRQVRETFWSAASTS
                                                                                                                                                          PRWHDAFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAISLTREVRNRFWQTPSSQ
                                                                                                                                                                                              IDLRAXEFEFKKOFGPAIVSLIDOHFGSAMTGSNLRDELVEKVNKTLAKRLEOTNSYDLV
                                                                                                                                                                                                                                                                  AAYTSELGHLANPVTTHVQPAEMANQAVNSLALISARRTTESNDVLSLLLATHLYCVLQA
                                                                                                                                                                                                                                                                                                AAYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQA
                                                                                                                                                                                                                                                                                                                                       AAAVANTMEKTRLGLAQIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIAA
                                                                                                                                                                                                                                                                                                                                                                                                             EGILRODRYPLRTSPOWLGPLVSDLIHAHAVLTIEAGQSTTDNPLIDVENKTSHHGGNFQ
                                                                                                                                                                                                                                                                                                                                                                                                                                    EGILRQDRYPLRTSPQFLGPLVEDMMHAYSTLSLE-NNTTTDNPLLDVENKQTAHGGNFQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 SLTAMTVEAMVGHAGSFHPFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     VVHEGKEKILYAREAMALFNLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSILSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         VLHEGTEKIMFAREAISLFGLEAVVLGPKEGLGLVNGTAVSASMATLSLHDSHMLSLLSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            SLTRGHSAVRLVVLEALTNFLNHXITPIVPLRGTISASGDLSPLSYIAAAISGHPDSKVH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               SLTRGHSAVRLVVLEALTNFLNHRITPIVPLRGSISASGDLSPLSYIAGAITGHPDVKVH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GFGGSADTRTEDAISLQKALLEHQLCGVLPSSFDSFRLGRGLENSLPLEVVRGAMTIRVN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  PTDDVVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSVYGVTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          MAPSIDSISHSFANG-----VASAKQAVNGASTNIAVAGSHIPTTQVTQVDIVEKMLAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      PTDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  72.4%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Asp,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ala,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 85;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Score 2613;
Pred. No. 1
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ser,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Glu,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Mismatches 104;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 glutinis
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Pro,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Gln
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                ; DB 9;
1.2e-228;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Gly
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Length 716;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 14;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Gaps
                                                                                                                                                                                                                                                                  534
                                                                                                                                                                                                                                                                                                                                                                                                             414
                                                                                                                                                                                                                                                                                                                                                                                                                                             419
                                                                                                                                                                                                                                                                                                                                                                                                                                                                               354
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    180
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      114
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        120
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          54
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       294
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          234
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  174
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            GENERAL INFORMATION:
GENERAL INFORMATION:
APPLICANT: Sariasiani, Sima
APPLICANT: Tang, Xiao-Song
APPLICANT: Qi, Wei Wei
TITLE OF INVENTION: Methods for the Productic
TITLE OF INVENTION: hydroxycinnamic Acid
FILE REFERENCE: CL1777
CURRENT APPLICATION NUMBER: US/10/138,970A
CURRENT FILING DATE: 2002-07-23
NUMBER OF SEQ ID NOS: 24
SOFTWARE: Microsoft Office 97
SEQ ID NO 19
LENGTH: 716
                              밁
                                                                Ş
                                                                                                     뭐
                                                                                                                                  5
                                                                                                                                                                           밁
                                                                                                                                                                                                         Š
                                                                                                                                                                                                                                             Ď,
                                                                                                                                                                                                                                                                               Ş
                                                                                                                                                                                                                                                                                                                    맑
                                                                                                                                                                                                                                                                                                                                                 Ş
                                                                                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                                                                                          S
                                                                                                                                                                                                                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Дb
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               US-10-138-970A-19
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Best Loc
Matches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Query Match
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Sequence 19, Application US/10138970A Publication No. US20030079255A1
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              LENGTH: 71
TYPE: PRT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              NAME/KEY: MISC FEATURE LOCATION: (540)...(540) OTHER INFORMATION: X=Thr,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ORGANISM: Rhodotorula glutinis
FEATURE:
NAME/KEY: MISC FEATURE
LOCATION: (198). (198)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                LOCATION: (198)...(198)
OTHER INFORMATION: Xaa=Asp,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     NAME/KEY: MISC_FEATURE LOCATION: (198)..(198)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      LOCATION: (198)..(198)
OTHER INFORMATION: X=Asp,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Local
 480
                                 415
                                                                   420
                                                                                                       355
                                                                                                                                       361
                                                                                                                                                                           295
                                                                                                                                                                                                             301
                                                                                                                                                                                                                                                 235
                                                                                                                                                                                                                                                                                   241
                                                                                                                                                                                                                                                                                                                      175
                                                                                                                                                                                                                                                                                                                                                      181
                                                                                                                                                                                                                                                                                                                                                                                          115
                                                                                                                                                                                                                                                                                                                                                                                                                          121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           712
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         522;
                                                                                                                                                                                                                                                                                                                                                                                                                                                              55
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1 MAPSIDSLATTLANGFTNGSHAAPTKSAAGPTSALRRTPGLDGHAAHQSQLEIVQELLSD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Similarity
                                                                                                                                                                                                     ALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEVKVKXDD
                                                                                                                                                                                                                                               VVHEGKEKILYAREAMALENLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLSQ
                                                                                                                                                                                                                                                                                                                    SLTRGHSAVRLVVLEALTNFLNHXITFIVPLRGTISASGDLSPLSYIAAAISGHPDSKVH
                                                                                                                                                                                                                                                                                                                                                 SLTRGHSAVRLVVLEALTNFLNHRITPIVPLRGSISASGDLSPLSYIAGAITGHPDVKVH
                                                                                                                                                                                                                                                                                                                                                                                                           GFGGSADTRTEDAVSLQXALIBHQLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIRVN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  MAPSLDSISHSFANG-----VASAKQAVNGASTNLAVAGSHLPTTQVTQVDIVEKMLAA
AAYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQA
                                                                                                     EGILRODRYPLRTSPQWLGPLVSDLIHAHAVLTIEAGQSTTDNPLIDVENKTSHHGGNFQ
                                                                                                                                     EGILRODRYPLRTSPOFLGPLVEDMMHAYSTLSLE-NNTTTDNPLLDVENKQTAHGGNFQ
                                                                                                                                                                             SLTAMTVEAMVGHAGSFHPFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEVKVKDD
                                                                                                                                                                                                                                                                     VLHEGTEKIMFAREAISLFGLEAVVLGPKEGLGLVNGTAVSASMATLSLHDSHMLSLLSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                            PTDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   PTDDVVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSVYGVTT
                                 <u>AAAVANTMEKTRIGIAQIGKINFTQITEMINAGMNRGIPSCLAAEDPSISYHCKGIDIAA</u>
                                                                 asavsismektrlalaligklinftoctellnaamirglesclaaedeslinyhgkgldihi
                                                                                                                                                                                                                                                                                                                                                                                          GFGGSADTRTEDAISLQKALLEHQLCGVLPSSFDSFRLGRGLENSLPLEVVRGAMTIRVN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           LKMLA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       72.4%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ala,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Asn,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         85,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Asn,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Score 2613; DB 14;
Pred. No. 1.2e-228;
5; Mismatches 104;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ser,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Glu,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Glu,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Production
c Acid
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Pro,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Gln
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Gly
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           of Tyrosine,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Length 716;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Cinnamic Acid
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         14;
```

Š

밁 8 밁 Š

Ş 밁

δ 밁

474 479 419 354

414

294

300 234

360

240

180 114

174

54

120

g 8 Вb Ş 뮍 8 В Ş B Ş B Š В Š βĎ

```
GENERAL INFORMATION:

APPLICANT: Tang, Xiao-Song

TITLE OF INVENTION: BIOPRODUCTION OF PARA-HYDROXYCINNAMIC ACID

FILE REFERENCE: BC1009 US DIVCIP

CURRENT APPLICATION NUMBER: US/10/188,523B

CURRENT FILING DATE: 2002-10.17

PRIOR APPLICATION NUMBER: US 09/627,216

PRIOR FILING DATE: 2000-07-27

PRIOR FILING DATE: 2000-07-27

PRIOR FILING DATE: 2000-07-27

PRIOR FILING DATE: 1909-08-06

NUMBER OF SEQ ID NOS: 38

SOFTWARE: Microsoft Office 97

SEQ ID NO 35

LENGTH: 716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  ; FEATURE:
, NAME/KEY: misc feature
; LOCATION: (540)...(540)
; OTHER INFORMATION: Xaa=
US-10-188-523B-35
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              RESULT 12
US-10-188-523B-35
; Sequence 35, Application US/10188523B
; Publication No. US20030170834A1
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                        B,
                                                                                                                                                                                                                                                                            Ş
                                                                                                                                                                                                                                                                                                                         B
                                                                                                            Ş
                                                                                                                                                           밁
                                                                                                                                                                                               S
                                  Ś
                                                                                                                                                                                                                                                                                                                                                                                                       Best Loc
Matches
                                                                                                                                                                                                                                                                                                                                                                                                                                              Query Match
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       FEATURE:
NAME/KEY: misc_feature
LOCATION: (198)..(198)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        OTHER INFORMATION: Xaa= Asp,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     TYPE: PRT ORGANISM: Rhodotorula glutinis mutant
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                475
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    652 SPALSYLSPRTQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNVL 711
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            656
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         596
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      540 VDLRAMBLDFKKQFDPLLFTLLQQHLG---TGLDV-NALALEVKKALNKRLEQTTTYDLE 595
                                                                            175
235
                                                                                                                     181
                                                                                                                                                             115
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       712 LKMLA 716
                                                                                                                                                                                                 121
                                                                                                                                                                                                                                                                                                                                                                                                       522;
                                                                                                                                                                                                                                          5
                                                                                                                                                                                                                                                                                61
                                                                                                                                                                                                                                                                                                                                                                                                                             Similarity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              VKMLA 720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              AAYTSELGHLANPVTTHVQPAEMANQAVNSLALISARRTTESNDVLSLLLATHLYCVLQA
                                                                                                                                                                                     GFGGSADTRTEDAVSLQKALIEHQLCGVTFTSXSSFSVGRGLENTLPLEVVRGAMVIRVN 180
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        APAHAYLSPRTRVLYSFVREELGVQARRGDVFVGVQQETIGSNVSRIYEAIKDGRINHVL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     PRWHDAFSFAAGTVVEVLSST---SLSLAAVNAWKVAAAESAISLTRQVRETFWSAASTS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         PRWHDAFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAISLTREVRNRFWQTPSSQ 655
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  IDLRAXEFEFKKQFGPAIVSLIDQHFGSAMTGSNLRDELVEKVNKTLAKRLEQTNSYDLV 594
                                                                                                                SLTRGHSAVRLVVLEALTNFLNHRITFIVPLRGSISASGDLSPLSYIAGAITGHPDVKVH
                                                                                                                                                                                                                                          PTDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVTT 114
                                                                                                                                                                                                                                                                   PTDDVVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSVYGVTT 120
                                                                                                                                                                                                                                                                                                                                                               MAPSIDSLATTLANGFINGSHAAPTKSAAGPTSALRRTPGLDGHAAHQSQLEIVQELLSD
VVHEGKEKILYAREAMALENLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLSQ 294
                                    VLHEGTEKIMFAREAISLFGLEAVVLGPKEGLGLVNGTAVSASMATLSLHDSHMLSLLSQ 300
                                                                              SLTRGHSAVRLVVLEALTNFLNHXITFIVPLRGTISASGDLSPLSYIAAAISGHPDSKVH
                                                                                                                                                             GFGGSADTRTEDAISLOKALLEHOLCGVLPSSFDSFRLGRGLENSLPLEVVRGAMTIRVN 174
                                                                                                                                                                                                                                                                                                                         MAPSIDSISHSFANG-----VASAKQAVNGASTNLAVAGSHLPTTQVTQVDIVEKNLAA 54
                                                                                                                                                                                                                                                                                                                                                                                                       Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                           72.4%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Thr, Ala, Ser, Pro, or
                                                                                                                                                                                                                                                                                                                                                                                                          85
;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Asn,
                                                                                                                                                                                                                                                                                                                                                                                                       Score 2613; DB 14; Length 716;
Pred. No. 1.2e-228;
5; Mismatches 104; Indels 14;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Glu,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          ę
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Gln
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Gly
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               715
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       651
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   534
                                                                                234
                                                                                                                       240
                                                                                                                                                                                                                                                                                                                                                                     60
```

```
; NAME/KEY: MISC FEATURE , LOCATION: (540)..(540) CTHER INFORMATION: Xaa= Thr, US-10-439-478-15
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     US-10-439-478-15; Sequence 15, Application US/10439478; Publication No. US20040018600A1
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    멼
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             멍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               $
                                                                                                                                                                                                                                                                                                                         FILE REFERENCE: CL1912
CURRENT APPLICATION NUMBER: US/10/439,478
CURRENT FILING DATE: 2003-05-16
PRIOR APPLICATION NUMBER: 60/383450
PRIOR FILING DATE: 2002-05-23
NUMBER OF SEQ ID NOS: 18
SOFTWARE: Microsoft Office 97
SEQ ID NO 15
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        GENERAL INFORMATION:
Best Local Similarity Matches 522; Conserv
                                  Query Match
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         APPLICANT: E.I. du Pont de Nemours
APPLICANT: Ben Bassat, Arie
APPLICANT: Qi Wei Wei
APPLICANT: Sariaslani, Sima
APPLICANT: Tang, Xao-Song
                                                                                                                                        FEATURE:
NAME/KEY: MISC FEATURE
LOCATION: (198)..(198)
OTHER INFORMATION: Xaa= A
FEATURE:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                       APPLICANT: Sariaslani, Sima
APPLICANT: Tang, Xac-Song
APPLICANT: Vanelli, Todd
TITLE OF INVENTION: Microbial Conversion of
                                                                                                                                                                                                                                                                 TYPE: PRT ORGANISM: artificial sequence
                                                                                                                                                                                                                                      OTHER INFORMATION: Mutant from Rhodotorula glutinis
                                                                                                                                                                                                                                                       FEATURE:
                                                                                                                                                                                                                                                                                                             ENGTH:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          652
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          656
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   596
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        535
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        540 VDIRAMELDEKKQEDELLETILQQHLG---TGLDV-NALALEVKKALNKRLEQTTTYDLE 595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             475
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    415
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         355
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                295 SLTAMTVEAMVGHAGSFHPFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHBBEVKVKDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   301 ALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTILSGSSFAVEHEEEVKVKDD 360
:|||:|||||||
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    712 LKMLA 716
                                                                                                                                                                                                                                                                                                             716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        EGILRODRYPLRTSPORTIGPLVEDMWHAYSTLSLE-NNTTTDNPLLDVENKQTAHGGNFQ 419
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       VKMLA 720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          SPALSYLSPRTQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNVL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      APAHAYLSPRTRVLYSFVREELGVQARRGDVFVGVQQETIGSNVSRIYBAIKDGRINHVL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      IDLRAXEFEFKKQFGPAIVSLIDQHFGSAMTGSNLRDELVEXVNKTLAKRLEQTNSYDLV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             AAYTSELGHLANPVTTHVQPAEMANQAVNSLALISARRTTESNDVLSLLLATHLYCVLQA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        AAYASELGHLANPUTTFUQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQA 539
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    AAAVANTMEKTRIGIAQIGKINFTQITEMINAGMNRGIPSCLAAEDPSISYHCKGIDIAA 474
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         ASAVSISMEKTRLALALIGKLNFTQCTELLNAAMNRGLPSCLAAEDPSLNYHGKGLDIHI 479
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         EGILRQDRYPLRTSPQWLGPLVSDLIHAHAVLTIEAGQSTTDNPLIDVENKTSHHGGNFQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 PRWHDAFSFAAGTVVEVLSST---SLSLAAVNAWKVAAAESAISLTRQVRETFWSAASTS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 PRWHDAFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAISLTREVRNRFWQTPSSQ 655
 Conservative
 72.4%; Score 2613; DB 15; 72.0%; Pred. No. 1.2e-228; rative 85; Mismatches 104;
                                                                                                                                                             Asp,
                                                                                        Ala,
                                                                                                                                                             Asn,
                                                                                          Ser,
                                                                                                                                                                 Glu,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        G
                                                                                                                                                                 ę
                                                                                        Pro, or Gly
                                      DB 15;
                                                                                                                                                                 Gln
                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Glucose
                                  Length 716;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                               to Para-Hydroxystyrene
     Indels
     14;
     Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 534
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    354
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               711
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     651
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            594
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               414
     υ
--
```

5 4

60

114

240

234

```
Sequence 10, Application US/09765873A

Patent No. US20010053847A1

GENERAL INFORMATION:
APPLICANT: Tang, Xiao-Song
TITLE OF INVENTION: BIOPRODUCTION OF PARA-HYDROXYCINNAMIC ACII
FILE REFERENCE: BC1009 US CIP
CURRENT APPLICATION NUMBER: US/09/765,873A
CURRENT APPLICATION NUMBER: US/09/827,216
PRIOR APPLICATION NUMBER: US/09/827,216
PRIOR FILING DATE: 2001-01-19
PRIOR APPLICATION NUMBER: US 60/147,719
PRIOR APPLICATION NUMBER: US 60/147,719
PRIOR FILING DATE: 1909-08-06
NUMBER OF SEQ ID NOS: 38
SOFTWARE: Microsoft Office 97
SEQ ID NO 10
LENGTH: 716
TYPE: PRT
ORGANISM: mutant from Rhodotorula glutinis
                                                                                                                                                                                                                                                                                                                                       RESULT 14
US-09-765-873A-10
                                                                                                                                                                                                                                                                                                                                                                                                                      712
                                                                                                                                                                                                                                                                                                                                                                                                                                                     716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              652
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                656
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        596
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           535
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      475
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               415
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     355
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            295
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      235
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               175
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      115
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            55
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                61
                                                                                                                                                                                                                                                                                                                                                                                                                                                       VICMLA 720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          SPALSYLSPRIQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNVL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              PRWHDAFSFAAGTVVEVLSST---SLSLAAVNAWKVAAAESAISLTRQVRETFWSAASTS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        PRWHDAFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAISLTREVRNRFWQTPSSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          IDLRAXEFEFKKQFGPAIVSLIDQHFGSAMTGSNLRDELVEKVNKTLAKRLEQTNSYDLV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            AAYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              ASAVSISMEKTRLALALIGKLNFTQCTELLNAAMNRGLPSCLAAEDPSLNYHGKGLDIHI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             BGILRQDRYPLRTSPQWLGPLVSDLTHAHAVLTIBAGQSTTDNPLIDVENKTSHHGGNFQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         EGILRQDRYPLRTSPQFLGPLVEDMMHAYSTLSLE-NNTTTDNPLLDVENKQTAHGGNFQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               VVHEGKEKILYAREAMALENLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      SLTRGHSAVRLVVLEALTNFLNHRITPIVPLRGSISASGDLSPLSYIAGAITGHPDVKVH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                GFGGSADTRTEDAISLQKALLEHQLCGVLPSSFDSFRLGRGLENSLPLEVVRGAMTIRVN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        PTDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               VDLRAMELDFKKQFDPLLPTLLQQHLG---TGLDV-NALALEVKKALNKRLEQTTTYDLE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                AAYTSELGHLANPVTTHVQPAEMANQAVNSLALISARRTTESNDVLSLLLATHLYCVLQA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         AAAVANTMEKTRLGLAQIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          SLTAMTVEAMVGHAGSFHPFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         ALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         SLTRGHSAVRLVVLEALTNFLNHXITPIVPLRGTISASGDLSPLSYIAAAISGHPDSKVH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GFGGSADTRTEDAVSLQKALIEHQLCGVTPTSXSSFSVGRGLENTLPLEVVRGAWVIRVN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        PTDDVVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSVYGVTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          MAPSIDSLATTLANGFTNGSHAAPTKSAAGPTSALRRTPGLDGHAAHQSQLEIVQELLSD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 MAPSLDSISHSFANG------VASAKQAVNGASTNLAVAGSHLPTTQVTQVDIVEKMLAA
                                                                                                                                                                                                                                                                                                                                                                                                                      716
                                                                                                                                                                                                                                                 ACID
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     419
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            715
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    655
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   539
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         474
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          711
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 651
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  534
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                479
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 414
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          354
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  174
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     180
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 294
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         234
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            120
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 54
US-10-138-970A-24

Sequence 24, Application US/10138970A

Publication No. US2030079255A1

GENERAL INFORMATION:

APPLICANT: Sariasiani, Sima

APPLICANT: Tang, Xiao-Song

APPLICANT: Qi, Wei Wei

TITLE OF INVENTION: Methods for the Production of

TITLE OF INVENTION: Methods for the Production of

TITLE OF INVENTION NUMBER: US/10/138,970A

CURRENT FILING DATE: 2002-07-23

NUMBER OF SEQ ID NOS: 24
                                                                                                                                                                                                                                                                                                      밁
                                                                                                                                                                                                                                                                                                                                   Š
                                                                                                                                                                                                                                                                                                                                                                          片
                                                                                                                                                                                                                                                                                                                                                                                                          Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                   B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            망
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         당
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            망
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      US-09-765-873A-10
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Query Match
Best Local Similarity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Matches
                                                                                                                                                                                                                                                                                                                                       716
                                                                                                                                                                                                                                                                                                                                                                            652
                                                                                                                                                                                                                                                                                                                                                                                                                656
                                                                                                                                                                                                                                                                                                                                                                                                                                                     595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        596
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            535
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    475
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             415
                                                                                                                                                                                                                                                                                                    712 LKMLA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             540 VDLRAMELDEKKOFDPLLPTLLQQHLG---TGLDV-NALALEVKKALNKRLEQTTTYDLE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   355
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            295
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    301 ALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     235
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    115
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                522;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            ហ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                61
                                                                                                                                                                                                                                                                                                                                       VKMLA 720
                                                                                                                                                                                                                                                                                                                                                                            SPALSYLSPRTQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNVL
                                                                                                                                                                                                                                                                                                                                                                                                    APAHAYLSPRTRVLYSFVREELGVQARRGDVFVGVQQETIGSNVSRIYEAIKDGRINHVL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          AAYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          VLHEGTEKIMFAREAISLFGLEAVVLGPKEGLGLVNGTAVSASMATLSLHDSHMLSLLSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 SLTRGHSAVRLVVLEALTNFLNHRITPIVPLRGSISASGDLSPLGYIAGAITGHPDVXVH
                                                                                                                                                                                                                                                                                                                                                                                                                                                 PRWHDAFSFAAGTVVEVLSST---SLSLAAVNAWKVAAAESAISLTRQVRETFWSAASTS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                       PRWHDAFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAISLTREVRNFWQTPSSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            IDLRATEFEFKKOFGPAIVSLIDOHFGSAMTGSNLRDELVEKVNKTLAKRLEOTNSYDLV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  AAYTSELGHLANPVTTHVQPAEMANQAVNSLALISARRTTESNDVLSLLLATHLYCVLQA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         AAAVANTMEKTRIGIAQIGKINFTQITEMINAGMNRGIPSCLAAEDPSISYHCKGIDIAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      ASAVSISMEKTRLALALIGKLNFTQCTELLNAAMNRGLPSCLAAEDPSLNYHGKGLDIHI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  EGILRODRYPLRTSPOWLGPLVSDLIHAHAVLTIEAGQSTTDNPLIDVENKTSHHGGNFQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         EGILRQDRYPLRTSPQFLGPLVEDMMHAYSTLSLE-NNTTTDNPLLDVENKQTAHGGNFQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          SLTAMTVEAMVGHAGSFHPFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 VVHEGKEKILYAREAMALFNLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         SITRGHSAVELVVLEALINFLNHGITFIVPLRGTISASGDLSPLSYIAAAISGHEDSKVH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GFGGSADTRTEDAVSLQKALIEHQLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIRVN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              PTDDVVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSVYGVTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     MAPSIDSISHSFANG---
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    MAPSLDSLATTLANGFTNGSHAAPTKSAAGPTSALRRTPGLDGHAAHQSQLEIVQELLSD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    GFGGSADTRTEDAISLQKALLEHQLCGVLPSSFDSFRLGRGLENSLPLEVVRGAMTIRVN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           PTDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Conservative
                                                                                                                                                                                                                                                                                                    716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           72.4%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            85;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ---VASAKQAVNGASTNLAVAGSHLPTTQVTQVDİVEKMLAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Score 2612; DB 9;
Pred. No. 1.4e-228;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Mismatches 104;
                                                                                              of.
                                                                                              Tyrosine,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Length 716;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Indels
                                                                                              Cinnamic
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            14;
                                                                                              Acid
```

5 В 8 B

715

and

Para-

655

594 595

651

534 539 474 479 419

354 360 294 300

414

Ś

밁 Ś 밁 Ş В

Ś 片 8 밁 Ş DЬ Ş ф Ş B δ В 5 밁

```
밁
                                                                       Ş
                                                                                                 Ŗ,
                                                                                                                      Š
                                                                                                                                                  뮍
                                                                                                                                                                         Ş
                                                                                                                                                                                                   밁
                                                                                                                                                                                                                        Ś
                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                         Ş
                                                                                                                                                                                                                                                                                                  Ď,
                                                                                                                                                                                                                                                                                                                          Ś
                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                           Ş
                                                                                                                                                                                                                                                                                                                                                                                                       멂
                                                                                                                                                                                                                                                                                                                                                                                                                             Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                      B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         맑
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ; SOFTWARE: Microsoft Office 97
; SEQ ID NO 24
; LENGTH: 716
; TYPE: PRT
; ORGANISM: artificial sequence
; PEATURE: INFORMATION: mutant from rhodotorula glutinis
US-10-138-970A-24
                      S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Query Match 72.4%; Score 2612; DB 14; Length 716; Best Local Similarity 72.0%; Pred. No. 1.4e-228; Matches 522; Conservative 85; Mismatches 104; Indels 14;
                                                                                                                                                                                                                           480
                                                                                                                                                                                                                                                                            420
                                               595
                                                                                                                                                  535
                                                                                                                                                                                                   475
                                                                                                                                                                                                                                                                                                  355 EGILRQDRYFURTSPQWLGFUVSDLIHAHAVLTIEAGQSTTDNFLIDVENKTSHHGGNFQ 414
                                                                                                                                                                                                                                                                                                                                                   121 GFGGSADTRTEDAVSLQKALIEHQLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIRVN 180
                                                                                                                          596
                                                                                                                                                                          540
                                                                                                                                                                                                                                                   415 AAAVANTMEKTRIGIAQIGKLNFTQITEMINAGMNRGIPSCLAAEDPSISYHCKGIDIAA 474
                                                                                                                                                                                                                                                                                                                           361
712 LKMLA 716
                       716 VKMLA 720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ç
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1 MAPSIDSLATTLANGFTNGSHAAPTKSAAGPTSALRRTPGLDGHAAHQSQLEIVQELLSD
                                                                                                                                                PTDDVVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSVYGVTT 120
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      MAPSIDSISHSFANG-----VASAKQAVNGASTNIAVAGSHIPTTQVTQVDIVEKMIAA
                                                                                                                                                                                                               AAYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQA 539
                                                                                                                                                                                                                                                                ASAVSISMEKTRLALALIGKLNFTQCTELLNAAMNRGLPSCLAAEDPSLNYHGKGLDIHI 479
                                                                                                PRWHDAFSFAAGTVVEVLSST---SLSLAAVNAWKVAAAESAISLTRQVRETFWSAASTS
                                                                                                               PRWHDAFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAISLTREVRNRFWQTPSSQ 655
                                                                                                                                                                                                  AAYTSELGHLANPYTTHYQPAEMANQAVNSLALISARRTTESNDYLSLLLATHLYCYLQA 534
                                                                                                                                                                                                                                                                                                                  EGILRQDRYPLRTSPQFLGPLVEDMMHAYSTLSLE-NNTTTDNPLLDVENKQTAHGGNFQ 419
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Gaps
                                                                                                 651
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        54
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         ū
```

Search completed: September Job time: 95.6141 secs

9

2004, 10:24:24

```
Title:
Perfect score:
Sequence:
Result
No.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Database
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Post-processing: Minimum Match 0%
Maximum Match 100%
Listing first 45 summaries
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Minimum DB
Maximum DB
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Scoring table:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 OM protein -
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Total number
                                                                                                                           Pred. No. is the number of results predicted by chance to have a score greater than or equal to the score of the result being printed, and is derived by analysis of the total score distribution.
  Score
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 seq
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            of hits satisfying chosen parameters:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            protein search, using sw model
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 length: 0
length: 2000000000
  Query
Match Length DB
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                BLOSUM62
Gapop 10.0 ,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           September 9, 2004, 10:04:14; Search time 295.768 Seconds (without alignments) 2376.050 Million cell updates/sec
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   US-09-939-408A-13
3610
                                                                                                                                                                                                                                 6019581 segs, 976053577 residues
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Pending_Patents_AA_Main:*
l: /cgn2_6/ptodata/2/paa/
                                                                                                                                                                                                           / Cgn2_6/ptodata/2/paa/US06_COMB.pep: *
/ Cgn2_6/ptodata/2/paa/US06_COMB.pep: *
/ Cgn2_6/ptodata/2/paa/US06_COMB.pep: *
/ Cgn2_6/ptodata/2/paa/US080_COMB.pep: *
/ Cgn2_6/ptodata/2/paa/US080_COMB.pep: *
/ Cgn2_6/ptodata/2/paa/US083_COMB.pep: *
/ Cgn2_6/ptodata/2/paa/US093_COMB.pep: *
/ Cgn2_6/ptodata/2/paa/US095_COMB.pep: *
/ Cgn2_6/ptodata/2/paa/US096_COMB.pep: *
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           MAPSIDSLATTLANGFTNGS......RIYEAIKDGRINHVLVKMLA 720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       GenCore version 5.1.6
Copyright (c) 1993 - 2004 Compugen Ltd.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Gapext 0.
     H
                                                                             SUMMARIES
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               6019581
  Description
```

```
1 3608 99.9 720 1 PCT-USO2-Z6934A-13 Sequence 13, Appl 2770 76.7 726 1 VS-09-99-408A-13 Sequence 21, Appl 2770 76.7 726 24 US-09-99-408A-21 Sequence 21, Appl 2770 76.7 726 24 US-09-99-408A-21 Sequence 21, Appl 2770 76.7 726 24 US-09-99-408A-30 Sequence 20, Appl 2770 76.7 720 24 US-09-99-408A-30 Sequence 20, Appl 2770 76.7 720 24 US-09-99-408A-30 Sequence 20, Appl 2770 76.7 720 24 US-09-99-408A-30 Sequence 21, Appl 2770 76.7 720 24 US-09-99-408A-30 Sequence 22, Appl 2770 76.7 77.4 716 1 PCT-USO2-Z6934A-19 Sequence 23, Appl 2770 77.4 77.6 27 US-10-188-523B-8 Sequence 24, Appl 2770 77.4 77.6 27 US-10-188-523B-8 Sequence 24, Appl 2770 77.4 77.6 27 US-10-188-523B-8 Sequence 27, Appl 2770 77.4 77.6 27 US-10-188-523B-3 Sequence 27, Appl 2770 77.2 77.6 27 US-10-188-523B-3
```

## ALIGNMENTS

```
PCT-US02-26934A-13
Sequence 13, Application PC/TUS0226934A
Sequence 13, Application PC/TUS0226934A
GENERAL INFORMATION:
APPLICANT: PCBU Services, Inc. et al.
TITLE OF INVENTION: Polynuclectide Ammonia Lyase Polypeptide and
TITLE OF INVENTION: Using Same
FILE REFERENCE: 29479/500NSCA PCT
CURRENT APPLICATION UNMBER: PCT/US02/26934A
CURRENT FILING DATE: 2002-08-23
PRIOR APPLICATION NUMBER: PCT/US02/26934A
CURRENT FILING DATE: 2001-08-24
NUMBER OF SEQ ID NOS: 30
SEQ ID NO 13
LENGTH: 720
TYPE: PRT
CORGANISM: Rhodotorula graminis
FEATURE:
NAME/KEY: Unsure
LOCATION: (153)
COTHER INFORMATION: Other information: Xaa = Val or Ala
```

```
US-09-939-408A-13

US-09-939-408A-13

Sequence 13, Application US/09939408A

GENERAL INFORMATION:

APPLICANT: Yoshida, Roberta
APPLICANT: Koststra, Anna

TITLE OF INVENTION: Polynuclectide Sequences and Methods of Obtaining and TITLE OF INVENTION: Using Same
FILE OF INVENTION: Using Same
FILE REFERENCE: 2947/500NSCA

CURRENT APPLICATION NUMBER: US/09/939,408A

CURRENT APPLICATION NUMBER: US/09/939,408A

CURRENT FILING DATE: 2001-09-24

PRIOR APPLICATION NUMBER: US 09/624,693

PRIOR FILING DATE: 2001-07-24

PRIOR APPLICATION NUMBER: PCT/US01/23270

PRIOR FILING DATE: 2001-07-24

PRIOR APPLICATION NUMBER: PCT/US01/23270

PRIOR FILING DATE: 2001-07-24

NUMBER OF SEQ ID NOS: 30

SOFTWARE: PatentIn Ver. 2.0
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    음 성
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ъ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   D.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   g
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        뫄
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               PCT-US02-26934A-13
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Matches 720;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Query Match
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Local
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          661
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    601
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 601
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           541
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     541
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    481
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           481
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        421
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  421
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  \vdash
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Similarity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         MAPSLDSLATTLANGFTNGSHAAPTKSAAGPTSALRRTPGLDGHAAHQSQLEIVQELLSD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                YLSPRTRVLYSFVREELGVQARRGDVFVGVQQETIGSNVSRIYEAIKDGRINHVLVKMLA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       YLSPRIRVLYSFVREELGVQARRGDVFVGVQQETIGSNVSRIYEAIKDGRINHVLVKMLA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      AFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAISLTREVRNRFWQTPSSQAPAHA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              AFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAISLTREVRNRFWQTPSSQAPAHA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           DLRAMELDFKKQFDPLLPTLLQQHLGTGLDVNALALEVKKALNKRLEQTTTYDLEPRWHD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              DLRAMBLDFKKQFDPLLPTLLQQHLGTGLDVNALALEVKKALNKRLEQTTTYDLEPRWHD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    AYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQAV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         AYASELGHLANFYTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQAV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             SAVSISMEKTRLALALIGKLNFTQCTELLNAAMNRGLPSCLAABDPSLNYHGKGLDIHIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            EGILRODRYPLRTSPOFLGPLVEDMMHAYSTLSLENNTTTDNPLLDVENKOTAHGGNFOA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      EGILRQDRYPLRTSPQFLGPLVEDMMHAYSTLSLENNTTTDNPLLDVENKQTAHGGNFQA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     ALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         VLHEGTEKIMFAREAISLFGLEAVVLGPKEGLGLVNGTAVSASMATLSLHDSHMLSLLSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             VLHEGTEKIMFAREAISLFGLEAVVLGPKEGLGLVNGTAVSASMATLSLHDSHMLSLLSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                SLTRGHSAVRLVVLEALTNFLNHRITPIVPLRGSISASGDLSPLSYIAGAITGHPDVKVH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       SLTRGHSAVRLVVLEAL INFLNHRITE IVPLRGSISASGDLSPLSYIAGAITGHEDVKVH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       GFGGSADTRTEDAVSLQKALIEHQLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIRVN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GFGGSADTRTEDAVSLQKALIEHQLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIRVN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         PTDDVVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSVYGVTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     PTDDVVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSVYGVTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               MAPSIDSLATTLANGFTNGSHAAPTKSAAGPTSALRRTPGIDGHAAHQSQLEIVQEILSD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   SAVSISMEKTRLALALIĞKLNFTQCTELLNAAMNRGLPSCLAAEDPSLNYHGKGLDIHIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         99.9%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      0
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Score 3608;
Pred. No. |
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Mismatches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             0
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      0
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                720;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      0
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 660
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           600
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     600
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     120
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    660
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    180
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 180
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           120
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  60
                                                               RESULT 3
PCT-US02-26934A-21

Sequence 21, Application PC/TUS0226934A

GENERAL INFORMATION:

APPLICANT: PCBU Services, Inc. et al.

TITLE OF INVENTION: Phenylalanine Ammonia Lyase Pol

TITLE OF INVENTION: Polynucleotide Sequences and M
TITLE OF INVENTION: Using Same

TUSON TO THE POLYNUCLEOTION OF THE POLYNUCLEON OF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             ; FEATURE:
; NAME/KEY: unsure
; LOCATION: (153)
; OTHER INFORMATION: (
US-09-939-408A-13
                                                                                                                                                                                                                                                                                                                                                                          S
                                                                                                                                                                                                                                                                                                                                                                                                                         В
                                                                                                                                                                                                                                                                                                                                                                                                                                                          δõ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             뫄
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           15
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              몽
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Matches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Query Match
Best Local
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         3Q ID NO 13
LENGTH: 720
TYPE: PRT
ORGANISM: Rhodotorula
                                                                                                                                                                                                                                                                                                                                                                                 661
                                                                                                                                                                                                                                                                                                                                                                                                                            601
                                                                                                                                                                                                                                                                                                                                                                                                                                                                      601
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                541
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          541
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    481
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 481
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           421
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     421
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               241
                                                                                                                                                                                                                                                                                                                                       661
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ш
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 μ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Similarity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     MAPSLDSLATTLANGFTNGSHAAPTKSAAGPTSALRRTPGLDGHAAHQSQLEIVQELLSD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          DLRAMELDFKKQFDFLLFTLLQQHLGTGLDVNALALEVKKALNKRLEQTTTYDLEPRWHD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    ALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                               YLSPRTRVLYSFVREELGVQARRGDVFVGVQQETIGSNVSRIYEAIKDGRINHVLVKYLA
                                                                                                                                                                                                                                                                                                                                                                                                                                                          AFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAISLTREVRNRFWQTPSSQAPAHA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                AYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQAV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       SAVSISMEKTRLALALIGKLNFTQCTELLNAAMNRGLPSCLAAEDPSLNYHGKGLDIHIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      VLHEGTEKIMFAREAISLFGLEAVVLGPKEGLGLVNGTAVSASMATLSLHDSHMLSLLSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GFGGSADTRTEDAVSLQKALIEHQLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIRVN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          GFGGSADTRTEDAVSLQKALIEHQLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIRVN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            PTDDVVELSGYSLTVRDVVGAARKGRRVRVQNDDE IRARVDKSVDFLKAQLQNSVYGVTT
                                                                                                                                                                                                                                                                                                                                       YLSPRTRVLYSFVREELGVQARRGDVFVGVQQETTGSNVSRIYEAIKDGRINHVLVKMLA
                                                                                                                                                                                                                                                                                                                                                                                                                            AFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAISLTREVRNRFWQTPSSQAPAHA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  DLRAMELDFKKQFDPLLPTLLQQHLGTGLDVNALALEVKKALNKRLEQTTTYDLEPRWHD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      AYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQAV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           SAVSISMEKTRLALIGKLNFTQCTELLNAAMNRGLPSCLAAEDPSLNYHGKGLDIHIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    EGILRODRYPLRTSPOFLGPLVEDMWHAYSTLSLENNTTTDNPLLDVENKQTAHGGNFOA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           EGILRODRYPLRTSPOFLGPLVEDMMHAYSTLSLENNTTTDNPLLDVENKOTAHGGNFOA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      ALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               VLHEGTEKIMFAREAISLFGLEAVVLGPKEGLGLVNGTAVSASMATLSLHDSHMLSLLSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     SLTRGHSAVRLVVLEALTNFLNHRITPIVPLRGSISASGDLSPLSYIAGAITGHPDVKVH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 SLTRGHSAVRLVVLEALTNFLNHRITPIVPLRGSISASGDLSPLSYIAGAITGHPDVKVH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              PTDDVVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSVYGVTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       MAPSLDSLATTLANGFTNGSHAAPTKSAAGPTSALRRTPGLDGHAAHQSQLEIVQELLSD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Other information:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              100.0%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         graminis
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     99.98;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           0
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Score 3608;
Pred. No. 0;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Mismatches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Xaa
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         II
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     DB
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Val
                                                                                                                                       se Polypeptide and and Methods of Ob
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         0;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         or
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ala
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   720;
                                                                                                                                       Obtaining
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           0
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Gaps
```

480

540 600 600 660 660 720 420

180 240 240 300 360 360 180

0; 60 120

```
CURRENT FILING DATE: 2002-08-23
PRIOR APPLICATION NUMBER: US 09/939,408
PRIOR FILING DATE: 2001-08-24
NUMBER OF SEQ ID NOS: 30
SOFTWARE: PatentIn Ver. 2.0
SEQ ID NO 21
LENGTH: 726
TYPE: PRT
ORGANISM: Artificial Sequence
맑
                   Ş
                                                         뫄
                                                                                   8
                                                                                                                      밁
                                                                                                                                              Ş
                                                                                                                                                                                   В
                                                                                                                                                                                                             Ş
                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                             Ś
                                                                                                                                                                                                                                                                                                            밁
                                                                                                                                                                                                                                                                                                                                     Ś
                                                                                                                                                                                                                                                                                                                                                                         В
                                                                                                                                                                                                                                                                                                                                                                                                   Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                    В
                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          g
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       g
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              PCT-US02-26934A-21
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Query Match
Best Local
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           OTHER INFORMATION:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       NAME/KEY: SITE LOCATION: (12)..(71 OTHER INFORMATION:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            FEATURE:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       FEATURE:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Local Similarity
es 564; Conser
                                                                                                                                                                                                                                                                                                            421
                                                                                                                                                                                                                                                                                                                                          419
                                                                                                                                                                                                                                                                                                                                                                           361
                                                                                                                                                                                                                                                                                                                                                                                                      360
                                                                                                                                                                                                                                                                                                                                                                                                                                      301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                   300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            121
721
                           715
                                                                                                                       601
                                                                                                                                                                                                                  539
                                                                                                                                                                                                                                                 481
                                                                                                                                                                                                                                                                                479
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           180
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        120
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  ш
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                MAPSIDSLATTIANGFTNGSHAAPTKSAAGPTSALRRTPGIDGHAAHQSQIEIVQELISD
                                                                                                                                                EPRWHDAFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAISLTREVRNRFWQTPSS
                                                                                                                                                                                                                                                                                                                                                                                                                                                              QALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEVKVKD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  HVXHEGXEKIMXAREAIALFGLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   HVLHEGTEKIMFAREAISLFGLEAVVLGPKEGLGLVNGTAVSASMATLSLHDSHMLSLLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               NSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAITGHPDSKV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      NSLTRGHSAVRLVVLEALTNFLNHRITPIVPLRGSISASGDLSPLSYIAGAITGHPDVKV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           TGFGGSADTRTEDAVSLQKALIEHQLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIRV 179
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        P-TDDVVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSVYGVT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    MAPSLDSIATSXANGXXNGXHAAXXASXXXXXXXXAXAGSXLPTTXXTQLDIVEXXLAD
LVKMLA 726
                                                           SSPALXYLSPRTRVLYSFVREELGVKARRGDVFLGKQEVTIGSNVSRIYEAIKSGRINXV
                                                                              QAPAHAYLSPRTRVLYSFVREELGVQARRGDVFVGVQQETIGSNVSRIYEAIKDGRINHV
                                                                                                                                                                                                                                                 AAAYTSELGHLANPVTTHVQPAEMGNQAVNSLALISARRTAEANDVLSLLLATHLYCVLQ
                                                                                                                                                                                                                                                                 IAAYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQ
                                                                                                                                                                                                                                                                                                          QASAVXNTMEKTRLALALIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIA
                                                                                                                                                                                                                                                                                                                                     QASAVSISMEKTRLALALIGKLNFTQCTELLNAAMNRGLPSCLAAEDPSLNYHGKGLDIH
                                                                                                                                                                                                                                                                                                                                                                                                      DEGILAÇORYPLATSPOFLGELVEDAMHAYSTLSLE-NNTTTDNFLLDVENKQTAHGGNF
                                                                                                                                                                                                                                                                                                                                                                                                                                    QALTALTVEAMVGHAGS FHP FLHDVTR PHPTQIEVARNIRTLLEGSX FAVHHEEEVKVKD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            TGFGGSADTRTEDAISLOKALLEHOLCGVLPTSXDSFXLGRGLENSLPLEVVRGAMTIRV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         PXTDDXXELDGYSLTLGDVVGAARKGRXVRVXDSDEIRXKIDKSVEFLRXQLXNSVYGVT
                           LVKMLA 720
                                                                                                                       EPRWHDAFSXATGTVVEXLSSXXXXXVSLAAVNAWKVAXAEKAISLTRXVRXXFWXAPSS
                                                                                                                                                                                   AVDLRAMEFEFKKQFXPXXXXLLXQHFGXXXTXXXXXXELXXKVXKXLXKRLEQTNSYDL
                                                                                                                                                                                                                AVDLRAMELDFKKQFDFLLFTLLQQHLGTGLDVNA----LALEVKKALNKRLEQTTTYDL
                                                                                                                                                                                                                                                                                                                                                                           DEGILRODRYPLRTSPOWLGPLVSDMIHAHAVLSLEAGOSTTDNPLIDVENKXTHHGGNF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      . (719)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Description of Artificial Sequence: SEQ ID NOS: 13, 17, and 19
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         "Xaa"means
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            76.7%;
77.7%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 40;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Score 2770; Di
Pred. No. 4.3e
10; Mismatches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       any amino acid; "Xaa means
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              DB 1;
1.3e-262;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Consensus
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         no consensus
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               6
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          at that
                                                                                                                                                                                                                                                                                                              480
                                                                                                                                                                                                                                                                                                                                                                                                        418
                                                                                                                                                                                                                  594
                                                                                                                                                                                                                                                 540
                                                                                                                                                                                                                                                                                                                                           478
                                                                                                                                                                                                                                                                                                                                                                                                                                                                   359
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             239
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            180
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   60
                                                                                        714
                                                                                                                                                     654
                                                                                                                                                                                                                                                                                538
                                                                                                                                                                                                                                                                                                                                                                           420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                299
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         120
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    60
                                                                                                                       660
                                                                                                                                                                                    600
                                                                                                                                                                                                                                                                                                                                                                                                                                      360
```

```
RESULT 4

US-09-939-408A-21

Sequence 21, Application US/09939408A

GENERAL INFORMATION:

APPLICANT: Yoshida, Roberta

APPLICANT: Yoshida, Roberta

APPLICANT: KOCLETRA, Anna

TITLE OF INVENTION: Phenylalanine Ammonia Lya

TITLE OF INVENTION: Using Same

FILE OF INVENTION: Using Same

FILE REFERENCE: 29479/500NSCA

CURRENT APPLICATION NUMBER: US/09/939,408A

CURRENT FILING DATE: 2001-08-24

PRIOR APPLICATION NUMBER: US 09/624,693

PRIOR FILING DATE: 2000-07-24

PRIOR APPLICATION NUMBER: PCT/US01/23270

PRIOR APPLICATION NUMBER: PCT/US01/23270

PRIOR TILING DATE: 2001-07-24

NUMBER OF SEQ ID NOS: 30

SOFTWARE: Patentin Ver. 2.0

SOFTWARE: Patentin Ver. 2.0
뮍
                            δ
                                                                     B
                                                                                                      Ş
                                                                                                                                          뮍
                                                                                                                                                                             Š
                                                                                                                                                                                                                    뮍
                                                                                                                                                                                                                                                 δ
                                                                                                                                                                                                                                                                                             뮍
                                                                                                                                                                                                                                                                                                                              Ş
                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                 Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                          片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                         5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          US-09-939-408A-21
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Query Match
Best Local 9
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Matches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 FEATURE:
NAME/KEY: SITE
LOCATION: (12)..(719)
OTHER INFORMATION: "Xaa"means any amino acid; "Xaa"means no consensus
OTHER INFORMATION: Description of Artificial Sequence: Consensus of
OTHER INFORMATION: SEQ ID NOs: 13, 17, and 19
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             LENGTH: 726
TYPE: PRT
ORGANISM: Artificial Sequence
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Local Similarity
hes 564; Conserv
   481
                                                                         421
                                                                                                              419
                                                                                                                                              361
                                                                                                                                                                                   360
                                                                                                                                                                                                                        301
                                                                                                                                                                                                                                                          300
                                                                                                                                                                                                                                                                                               241
                                                                                                                                                                                                                                                                                                                                                                     181
                                                                                                                                                                                                                                                                                                                                                                                                         180
                                                                                                                                                                                                                                                                                                                                                                                                                                            121
                                                                                                                                                                                                                                                                                                                                240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                               120
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           ш
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1 MAPSIDSLATTLANGFTNGSHAAPTKSAAGPTSALRRTPGIDGHAAHQSQLEIVQELLSD
                                                                                            QASAVSISMEXTRIALALIGKLNFTQCTELLNAAMNRGLPSCLAAEDPSLNYHGKGLDIH
                                                                                                                                                                    DEGILRODRYPLRTSPOFLGPLVEDMMHAYSTLSLE-NNTTTDNPLLDVENKQTAHGGNF
                                                                                                                                                                                                                                                                                                                                                                                                   NSLTRGHSAVRLVVLEALTNFLNHRITPIVPLRGSISASGDLSPLSYIAGAITGHPDVKV
                                                                                                                                                                                                                                                                                                                                                                                                                                                               TGFGGSADTRTEDAVSLQKALIEHQLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIRV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         P-TDDVVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSVYGVT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         MAPSIDSIATSXANGXXNGXHAAXXASXXXXXXXXXAXAGSXIPTTXXTQIDIVEXXIAD
                                IAAYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQ
                                                                                                                                                                                                                                                   QALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEVKVKD
                                                                                                                                                                                                                                                                                               HVXHEGXEKIMXAREAIALFGLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                                                                                                                                                                                                                                                                                                                  HYLHEGTEKIMFAREAISLFGLEAVVLGPKEGLGLVNGTAVSASMATLSLHDSHMLSLLS
                                                                                                                                                                                                                                                                                                                                                                   TGFGGSADTRTEDAISLQKALLEHQLCGVLPTSXDSFXLGRGLENSLPLEVVRGAMTIRV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 PXTDDXXELDGYSLTLGDVVGAARKGRXVRVXDSDETRXKIDKSVEFLRXQLXNSVYGVT
   AAAYTSELGHLANFVTTHVQPAEMGNQAVNSLALISARRTAEANDVLSLLLATHLYCVLQ
                                                                       QASAVXNTMEKTRLALALIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIA
                                                                                                                                                DEGILRODRYPLRTSPOWLGPLVSDMIHAHAVLSLEAGOSTTDNPLIDVENKXTHHGGNF
                                                                                                                                                                                                                        QALTALTVEAMVGHAGSFHPFLHDVTRPHPTQIEVARNIRTLLEGSXFAVHHEEEVKVKD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    76.7%;
77.7%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  40;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Score 2770; DB 24;
Pred. No. 4.3e-262;
0; Mismatches 116;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ammonia Lyase Polypeptide and
de Sequences and Methods of Obtaining
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Sequences
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Length 726;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    6
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            and
                                      538
                                                                                                               478
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 179
     540
                                                                             480
                                                                                                                                                                                       418
                                                                                                                                                                                                                                                              359
                                                                                                                                                                                                                                                                                                 300
                                                                                                                                                                                                                                                                                                                                                                        240
                                                                                                                                                                                                                                                                                                                                                                                                         239
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     120
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        119
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               60
                                                                                                                                                  420
                                                                                                                                                                                                                          360
                                                                                                                                                                                                                                                                                                                                    299
                                                                                                                                                                                                                                                                                                                                                                                                                                              180
```

tsod

AVDLRAMELDFKKQFDPLLPTLLQQHLGTGLDVNA---

LALEVKKALNKRLEQTTTYDL

```
TITLE OF INVENTION: Polynuclectide Sequences
TITLE OF INVENTION: Using Same
FILE REFERENCE: 29479/500NGA PCT
CURRENT APPLICATION NUMBER: PCT/US02/26934A
CURRENT FILING DATE: 2002-08-23
PRIOR APPLICATION NUMBER: US 09/939,408
PRIOR FILING DATE: 2001-08-24
NUMBER OF SEQ ID NOS: 30
SOFTMARE: Patentin Ver. 2.0
SEQ ID NO 30
SEQ ID NO 30
TYPE: PRT
ORGANISM: Artificial Sequence
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           망
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           PCT-US02-26934A-30
Sequence 30, Application PC/TUS0226934A
GENERAL INFORMATION:
APPLICANT: PCBU Services, Inc. et al.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            APPLICANT: PCBU Services, Inc. et al.
TITLE OF INVENTION: Phenylalanine Ammonia Lyase Polypeptide and
TITLE OF INVENTION: Polynucleotide Sequences and Methods of Obtaining
                                     NAME/KEY: misc_feature LOCATION: (27)..(27) OTHER INFORMATION: The
                                                                                         LOCATION: (25)..(25)
OTHER INFORMATION: The
                                                                                                          NAME/KEY: misc_feature
LOCATION: (25)..(25)
                                                                                                                                               OTHER INFORMATION: The
                                                                                                                                                                                                  NAME/KEY: misc_feature
LOCATION: (19)..(19)
OTHER INFORMATION: The
                                                                                                                                                                                                                                                                                                           NAME/KEY: misc_feature
LOCATION: (16)..(16)
OTHER_INFORMATION: The
                                                                                                                                                                                                                                                                                                                                                                  NAME/KEY: misc feature LOCATION: (12)...(12) OTHER INFORMATION: The
                                                                                                                                                                                                                                                                                                                                                                                                                    NAME/KEY: misc_feature
LOCATION: (5)..(5)
OTHER INFORMATION: The
                                                                                                                                                                                                                                                                                                                                                                                                                                                                           OTHER INFORMATION:
OTHER INFORMATION:
                                                                                                                                                            NAME/KEY: misc_feature
                                                                                                                                                                                                                                                       LOCATION: (17)..(17)
OTHER INFORMATION: The
                                                                                                                                                                                                                                                                       NAME/KEY: misc_feature
LOCATION: (17)..(17)
                                                                                                                                                           OCATION:
                                                                                                                                                                                                                                                                                                    PEATURE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       541
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          721
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              661 SSPALXYLSPRIRVLYSFVREELGVKARRGDVFLGKQEVTIGSNVSRIYEAIKSGRINXV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         655
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  601
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             595
misc_feature
(28)..(28)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          LVKMLA 726
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    LVKMLA 720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               QAPAHAYLSPRTRVLYSFVREELGVQARRGDVFVGVQQETIGSNVSRIYEAIKDGRINHV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   EPRWHDAFSXATGTVVEXLSSXXXXXVSLAAVNAWKVAXAEKAISLTRXVRXXFWXAPSS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  EPRWHDAFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAISLTREVRNRFWQTPSS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Description theoretical
                                                                                                                                                                                                     'Xaa'
                                                                                                                                                                                                                                                          'Xaa'
                                                                                                                                                                                                                                                                                                              'Xaa'
                                                                                                                                                                                                                                                                                                                                                                                                                        'Xaa'
                                        'Xaa'
                                                                                             'Xaa'
                                                                                                                                                 'Xaa'
                                                                                                                                                                                                                                                                                                                                                                   'Xaa'
                                                                                                                                               at
                                                                                                                                                                                                                                                                                                                                                                                                                        at
                                      at
                                                                                            at
                                                                                                                                                                                                     at
                                                                                                                                                                                                                                                          аt
                                                                                                                                                                                                                                                                                                              at
                                                                                                                                                                                                                                                                                                                                                                   at
                                                                                                                                                                                                                                                                                                                                                                                                                                                                           of Artificial sequence based
                                                                                                                                                                                                     location
                                                                                                                                                                                                                                                                                                                                                                  location 12 stands for Val,
                                        location
                                                                                            location
                                                                                                                                               location
                                                                                                                                                                                                                                                          location
                                                                                                                                                                                                                                                                                                              location
                                                                                                                                                                                                                                                                                                                                                                                                                        location 5
                                        27 stands for Pro,
                                                                                                                                                                                                     19 stands for
                                                                                                                                                                                                                                                          17
                                                                                                                                                                                                                                                                                                              16
                                                                                            25
                                                                                                                                               20
                                                                                                                                                                                                                                                                                                                                                                                                                        stands
                                                                                                                                               stands
                                                                                            stands
                                                                                                                                                                                                                                                         stands for Thr,
                                                                                                                                                                                                                                                                                                              stands
                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Sequence:
                                                                                                                                                                                                                                                                                                                                                                                                                        for
                                                                                            for
                                                                                                                                                                                                                                                                                                              for
                                                                                                                                               for a stop codon,
                                                                                                                                                                                                                                                                                                                                                                                                                       · Val,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                            92
                                                                                          Thr,
                                                                                                                                                                                                     Gly.
                                                                                                                                                                                                                                                                                                            Val,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Preferred
SEQ ID NO:20
                                                                                                                                                                                                                                                                                                                                                                                                                       Leu,
                                                                                                                                                                                                                                                                                                                                                                  Leu,
                                         q
                                                                                                                                                                                                                                                          Ala,
                                                                                                                                                                                                                                                                                                            Leu,
                                        Ser
                                                                                                                                                                                                                                                                                                                                                                                                                        or Phe
                                                                                                                                                                                                                                                                                                                                                                   20
                                                                                            or
                                                                                                                                                                                                                                                          or
T
                                                                                                                                                                                                                                                                                                              ç
                                                                                                                                                                                                                                                                                                                                                                   Phe
                                                                                                                                                                                                                                                                                                              Phe
                                                                                                                                                 Ser,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   and
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      714
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            654
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  660
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       600
                                                                                                                                                 ٥r
                                                                                                                                                 Leu.
```

```
NAME/KEY:
LOCATION:
                                                                                      FEATURE:
NAME/KEY:
LOCATION:
                                                                                                                   NAME/KEY: misc feature LOCATION: (103)..(103) OTHER INFORMATION: The
                                                                                                                                                                                                                                                                                                                                                                                                    FEATURE: misc_feature NAME/KEY: misc_feature ...(56)...(56)
                                     LOCATION: (112) ... (112) OTHER INFORMATION: The
                                                 NAME/KEY: misc_feature
LOCATION: (112)..(112)
                                                                     OTHER INFORMATION: FEATURE:
                                                                                                                                                                   NAME/KEY: misc_feature
LOCATION: (102)..(102)
                                                                                                                                                                                                                                                                                      NAME/KEY: misc feature LOCATION: (76)...(76)
                                                                                                                                                                                                                                                                                                                                                                                               LOCATION: (56)..(56)
OTHER INFORMATION: The
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               OTHER INFORMATION:
                                                                                                                                                                                                OTHER INFORMATION:
                                                                                                                                                                                                         NAME/KEY: misc_feature LOCATION: (93)...(93)
                                                                                                                                                                                                                                       OTHER INFORMATION: The
                                                                                                                                                                                                                                                                            OTHER INFORMATION: The
                                                                                                                                                                                                                                                                                                                 LOCATION: (66)..(66)
OTHER INFORMATION: The
                                                                                                                                                                                                                                                                                                                                                          OTHER INFORMATION: The
                                                                                                                                                                                                                                                                                                                                                                          NAME/KEY: misc_feature
                                                                                                                                                                                                                                                                                                                                                                                                                                        OTHER INFORMATION: The
                                                                                                                                                                                                                                                                                                                                                                                                                                                NAME/KEY: misc_feature LOCATION: (54)...(54)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                              OTHER INFORMATION: The OTHER INFORMATION: Val,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               NAME/KEY: misc_feature
LOCATION: (48)..(48)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     NAME/KEY: misc_feature
LOCATION: (40)..(40)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   LOCATION: (39)..(39)
OTHER INFORMATION: The
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             NAME/KEY: misc_feature
LOCATION: (39) .. (39)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         LOCATION: (36)..(36)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               LOCATION: (34)..(34)
OTHER INFORMATION: The
                                                                                                                                                                                                                                                                                                                                    NAME/KEY: misc_feature
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              OTHER INFORMATION: The
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     NAME/KEY: misc_feature
LOCATION: (36)..(36)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        OTHER INFORMATION: The
: misc feature
: (114)..(114)
FORMATION: The
                                                                                       misc_feature
(109)..(109)
                                                                                                                                                                                                                                                misc_feature
(87)..(87)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    (36)
                                                                             The
                                                                                                                                                                                                 The
                                                                                                                                                          The
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          The
                                                                            'Xaa'
                                                                                                                    'Xaa'
                                                                                                                                                          'Xaa'
                                                                                                                                                                                                                                                                                                                   'Xaa'
                                                                                                                                                                                                                                                                                                                                                                                                                                                                              'Xaa'
Gln,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        'Xaa'
                                       'Xaa'
                                                                                                                                                                                                 'xaa'
                                                                                                                                                                                                                                       'Xaa'
                                                                                                                                                                                                                                                                             'Xaa'
                                                                                                                                                                                                                                                                                                                                                           'Xaa'
                                                                                                                                                                                                                                                                                                                                                                                                 'Xaa'
                                                                                                                                                                                                                                                                                                                                                                                                                                        'Xaa'
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     'Xaa'
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          'Xaa'
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 'Xaa'
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              'Xaa'
                                       t)
O
                                                                             tt
Di
                                                                                                                    ր
ը
                                                                                                                                                          ς
Ω
                                                                                                                                                                                                a
                                                                                                                                                                                                                                       at location
                                                                                                                                                                                                                                                                             at
                                                                                                                                                                                                                                                                                                                   at
                                                                                                                                                                                                                                                                                                                                                         at
                                                                                                                                                                                                                                                                                                                                                                                                 at
                                                                                                                                                                                                                                                                                                                                                                                                                                        a
t
                                                                                                                                                                                                                                                                                                                                                                                                                                                                              at location
Pro, or Leu.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              a
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     a
t
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          at
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                at
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        at location 28 stands for Ala, or Pro.
                                                                                                                   location 103 stands
                                       location
                                                                             location
                                                                                                                                                         location
                                                                                                                                                                                                 location
                                                                                                                                                                                                                                                                             location
                                                                                                                                                                                                                                                                                                                   location
                                                                                                                                                                                                                                                                                                                                                          location
                                                                                                                                                                                                                                                                                                                                                                                                 location
                                                                                                                                                                                                                                                                                                                                                                                                                                        location
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              location
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     location
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          location
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                location
                                       112
                                                                             109
                                                                                                                                                                                                 93
                                                                                                                                                                                                                                       87
                                                                                                                                                                                                                                                                             76
                                                                                                                                                                                                                                                                                                                   66
                                                                                                                                                                                                                                                                                                                                                          9
                                                                                                                                                                                                                                                                                                                                                                                                 9
                                                                                                                                                                                                                                                                                                                                                                                                                                        54
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      48
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              40
                                                                                                                                                          102 stands
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     39 stands
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          36
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                3
                                                                                                                                                                                                                                       stands
                                                                                                                                                                                                                                                                             stands
                                                                                                                                                                                                                                                                                                                                                                                                 stands
                                                                                                                                                                                                                                                                                                                                                                                                                                        stands
                                                                                                                                                                                                 stands
                                                                                                                                                                                                                                                                                                                   stands
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              stands
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                stands
                                                                                                                                                                                                                                                                                                                                                          stands
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       stands
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          stands
                                                                             stands
                                       stands
                                                                                                                                                                                                                                       for
                                                                                                                                                                                                                                                                             for
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     for
                                                                                                                                                                                                 for
                                                                                                                                                                                                                                                                                                                                                                                                                                        for
                                                                                                                                                                                                                                                                                                                   for
                                                                                                                                                                                                                                                                                                                                                           HO'R
                                                                                                                                                                                                                                                                                                                                                                                                 for Lys,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       for
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              for
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          for
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 for
                                                                                                                    for
                                       for
                                                                             for
                                                                                                                                                          for
                                                                                                                                                                                                                                       Thr,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ala,
                                                                                                                                                                                               Asp,
                                                                                                                                                                                                                                                                                                                   Ile,
                                                                                                                                                                                                                                                                                                                                                          Glu,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Lуs,
                                                                                                                                                                                                                                                                                                                                                                                                                                        ۷al
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Arg,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Thr
                                     Asp,
                                                                             Thr,
                                                                                                                  Arg, or
                                                                                                                                                                                                                                     Pro,
                                                                                                                                                                                                                                                                                                                   Val,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Gly,
                                                                                                                                                                                                 õ
                                                                                                                                                                                                                                                                                                                                                         Asp,
                                                                                                                                                                                                                                                                                                                                                                                                 Glu,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Thr,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Pro,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          or
                                                                            Ala,
                                                                                                                                                           or
                                       His, or Tyr
                                                                                                                                                                                                Ala.
                                                                                                                                                                                                                                        9
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Met,
                                                                                                                                                                                                                                                                                                                    or
                                                                                                                                                                                                                                                                                                                                                                                                  0
R
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              or
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     õ
                                                                             o
r
                                                                                                                                                                                                                                        Ser.
                                                                                                                                                                                                                                                                                                                                                                                                  Gln.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ser.
                                                                                                                                                                                                                                                                                                                   Leu
                                                                                                                                                                                                                                                                                                                                                           Val
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Glu,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ala,
```

OTHER INFORMATION:

'Xaa'

at location 114 stands

for

misc\_feature (117)..(117)

NAME/KEY: misc_feature	NAME/KEY: misc feature LOCATION: (305)(305) OTHER INFORMATION: The	NAME/KEY: misc feature LOCATION: (259)(259) OTHER INFORMATION: The	NAME/KEY: misc feature LOCATION: (251)(251) OTHER INFORMATION: The REATURE.	NAME/KEY: misc feature LOCATION: (246)(246) OTHER INFORMATION: The	NAME/KEY: misc_feature LOCATION: (242)(242) OTHER INFORMATION: The FEATURE:	LOCATION: (241)(241) OTHER INFORMATION: The	PEATURE: NAME/KEY: misc feature		OTHER INFORMATION: The OTHER INFORMATION: Cys, FEATURE:	NAME/KEY: misc feature LOCATION: (237)(237)	LOCATION: (225)(225) OTHER INFORMATION: The FEATURE:	OTHER INFORMATION: The FEATURE:	NAME/KEY: misc feature LOCATION: (223)(223)	OTHER INFORMATION: The FEATURE:	NAME/KEY: misc feature	LOCATION: (159)(159) OTHER INFORMATION: The	OTHER INFORMATION: The FEATURE: NAME/KEY: misc feature	: misc_feat  : (157)(1	OTHER INFORMATION: The FEATURE:	NAME/KEY: misc feature	OTHER INFORMATION: The	NAME/KEY: misc feature	OTHER INFORMATION: The	NAME/KEY: misc_feature	OCCATION: (148)(148) OTHER INFORMATION: The	OTHER INFORMATION: The FEATURE: NAME/KEY: misc feature
	'Xaa'	'Xaa'	'Xaa'	'Xaa'	'Xaa'	'Xaa'	2 0	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	'Xaa' or P		'Xaa'	'Xaa'		'Xaa'		'Xaa'	'Xaa'		'Xaa'		'Xaa'		'Xaa'		'Xaa'	'Xaa'
	at	t D	t) D	ρ ct	a) Ct	e t	Ď	t t	Phe.		ct D	at		a C		at	a t		at		at		a t		gy CT	ρ CT
	location	location	location	location	location	location	TOCALTOIL	1	location		location	location		location		location	location		location		location		location		location	location
	305	25 5 9	251	246	242	241	200	ນ ນ	237		225	223		183		159	157		154		153		150		148	117
	stands	stands	stands	stands	stands	stands	Scarres		stands		stands	stands		stands		stands	stands		stands		stands		stands		stands	stands
	for L	for L	for I	for L	for V	for V	101		for s		for s	for P		for T		for G	for S		for G		for I	,	for P		for V	for G
	Leu.	er,	Tyr,	Lys,	Val,	Val.	va⊥.	<u>.</u>	er,		er.	ro.		Thr.		ly.	er,		Glu,		le,		ro.		Val.	Gly.
	•	о ч	Ser,	Asn,	Leu,				Thr,								Gly,		or A		Val,					
		Phe.	o R	o R	OF.				ㅂ								OF.		ξp.		0				*	
			Phe.	Thr.	Phe.				le, Gly,								Arg.				Phe.					
									Ala,																	
		·							Val																	
	~. ~. ~. ~.	. ~. ~. ~.	. ~. ~. ~.	·· ·· · · · · · · · · · · · · · · · ·	N E	λ λο	da	Q	45 4d	Дb	νς	i 8	Дb	γo	ממ	Q g	, 15 15 15 15 15 15 15 15 15 15 15 15 15 1	da	γQ	מם	γo	ממ	Λō	מם	۸٥ .	
SEQ ID NO LENGTH:	PRIOR /	CURRENT APPI CURRENT FILL PRIOR APPLI	ииииг	Sequence GENERAL APPLICE	RESULT 6	•	-	•	- '	-		•	-	•	-		•	ŭ	•	ŭ	7	Ĭ	•	•	•	Query M Best Lo Matches
NO 30 H: 72	$H \vdash \vdash$	NT FIL	of in	e 30, INFO	4 0	661	601	601	541	481	481	421	361	361	301.	301.	241	181	181	121	121	61	61	<u>_</u>	ш	Match Local S les 551

```
YOSHIDA, ROBERTA

KOOLSTRA, Anna
KOOLSTRA, Anna
KOOLSTRA, Anna
KOOLSTRA, Anna
NVENTION: Phenylalanine Ammonia Lyase Polypeptide and
NVENTION: Polynucleotide Sequences and Methods of Obtaining
NVENTION: Using Same
ENCE: 29479/500NSCA
PPLICATION NUMBER: US/09/939,408A
JICATION NUMBER: US/09/939,408A
JICATION NUMBER: US/09/624,693
JICATION NUMBER: US/09/624,693
JICATION NUMBER: US/09/624,693
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   n 75.6%; Score 2730; DB 1; Similarity 76.5%; Pred. No. 3.7e-258; Similarity 76.5%; Pred. No. 3.7e-258; Conservative 45; Mismatches 124;
ICATION NUMBER: PCT/US01/23270
NG DATE: 2001-07-24
SEQ ID NOS: 30
Patentin Ver: 2.0
                                                                                                                                                                                                                                                                                                                                                    A-30
, Application US/09939408A
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     AYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQAV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                        AFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAISLTREVRNRFWQTPSSQAPAHA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            DLRAMELDFKKQFDPLLPTLLQQHLGTGLDVNALALEVKKALNKRLEQTTTYDLEPRWHD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                SAVSISMEKTRLALALIGKLNFTQCTELLNAAMNRGLPSCLAAEDPSLNYHGKGLDIHIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         ALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  VLHEGTEKIMFAREAISLFGLEAVVLGPKEGLGLVNGTAVSASMATLSLHDSHMLSLLSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      AFSFATGTVVELLSSSXXAKVSLAAVNAWKVASAEKAISLTRXVRDXFWXAPSSSSPALX
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       XAVANTMEKTRLALAL I GKLNFT OLTEMLNAGMNRGXXS CLAAEDXSLSYHCKGLDI AAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              EGILRORYPIRTSPOMIGPLVSDMIHAHAVLSLEAESTTDNPLIDVENKXTHHGGNFQA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         EGILRQDRYPLRTSPQFLGPLVEDMMHAYSTLSLENNTTTDNPLLDVENKQTAHGGNFQA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                SLXRGHSAVRLVVLEALINFLNHGITPIVPLRGTISASGDLSXLXXIAAAITGHPDXXXH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             SLTRGHSAVRLVVLEALTNFLNHRITPIVPLRGSISASGDLSPLSYIAGAITGHPDVKVH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           GFGGSADTRTEDAISLQKALLEHQLCGXLXTSXXSFXLXRGLENSLPLEVVRGAMTIRVN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       GFGGSADTRTEDAVSLQKALIEHQLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIRVN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               MAPSXDSTATSXANGXXNXXHAAPXKXXTGATSXLXRPXXLAPPATQXTQLDTXEXTLAD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              DLRAMEFEFKKQFDPXXXXLXXQHFGXALDGXELXDKVNKXLXKRLEQTNSYDLEPRWHD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            AYTSELXHLANPXTTHVQPREMGNQAVNSLALISARRXAEANDVLSLLLATHLYCXLQAV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         ALTAXTVEAMVGHAGSFHXFLHDVTRPHPTQIEVARNIRTLLEGSXFAVHHEEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       XXHEGXEKIMXAREAIALXGLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      PTDDXXELDGYTLTLXDVVGAARKGRXVRVQTXDEIRAKIDXXVEFLRXQLXNXVYXVTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 PTDDVVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSVYGVTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              MAPSLDSLATTLANGFTNGSHAAPTKSAAGPTSALRRTPGLDGHAAHQSQLEIVQELLSD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Length 720;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          0
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Gaps
                                                                                                                                                                                                                                     and
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  120
                                                                                                                                                                                                                                                                                                                                                                                                                                                                          720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                660
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             180
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       180
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      660
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 600
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             600
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      120
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                60
```

											., ., ., ., ., .,
NAME/KEY: misc feature LOCATION: (93)(93) OTHER INFORMATION: The NAME/KEY: misc feature LOCATION: the NAME/KEY: misc feature NAME/KEY: misc feature LOCATION: (103)(103)			misc_feature (54)(54) ORMATION: The misc_feature (56)(56) ORMATION: The	(40) . (40) ORMATION: The misc feature (48) . (48) ORMATION: The	LOCATION: (36)(36) OTHER INFORMATION: The ' NAME/KEY: misc feature LOCATION: (39)(39) OTHER INFORMATION: The ' NAME/KEY: Tipe for the '	NAME/KEY: misc teacure LOCATION: (28) (28) OTHER INFORMATION: The NAME/KEY: misc feature LOCATION: (34) (34) OTHER INFORMATION: The NAME/KEY: misc feature			LOCATION: (16) OTHER INFORMATION: The ' NAME/KEY: misc feature LOCATION: (17) - (17) OTHER INFORMATION: The ' NAME/KEY: misc feature		E t b
Xaa'	Xaa'	Xaa'	Xaa'	Xaa'	Xaa' Xaa'	Xaa' Xaa'	Xaa' Xaa'	Xaa' Xaa'	Xaa'	'Xaa' 'Xaa'	Sequence sscriptio neoretica
р р т	a a ct ct	a a	a a t t	a a	a a t t	а <u>а</u> С С	a a t t	a a t	क व्य त त	a at	
location location	location	location	location	location	location location	location location	location location	location location	location location	location location	of Artif: sequence
					ion						
93 st 102 s	76 st 87 st	66 st 65 st	56 st	40 st	36 st	28 st 34 st	25 st 27 st	19 st 20 st	16 st 17 st	N m	
stands stands	stands	stands stands	stands stands	stands	stands stands	stands stands	stands stands	tands	stands stands		Sequence:
for	for o	for (	for	for 1	for 1	for 7	for 1	for G	for v	for Va	uence: part on
	Gly. Thr,	Glu, J	val. Lys,	Arg, (	Arg, d	Ala, o	Thr, I	Gly. a stop	Val, 1	Val, L	Pre:
or Ala	Pro,	Asp, Val,	Glu,	Gly, Thr,	or Ser. Pro, or	or Pro	Pro, o	p codon,	Leu, Ala,	Leu, o	Preferred SEQ ID NO:
lla. Asn.	or se	or Val.	or Gln	or Trp	er. or Ser	0	or Ser		or Phe or Ser	or Phe.	red NO:20
	er.	u. 1.		Ę				Ser, or		· ·	
				Ala,				r Leu			
								•			
				Va							
*				Va							
zoofzofz	OFZOF:			Q FRQQ				£ % 0 £ % 0		LEGES C	3553553
NAME/K LOCATIL LOCATIL OTHER NAME/K LOCATIC LOCATIC COTHER OTHER NAME/K	LOCATI OTHER NAME/K LOCATI OTHER	LOCATI OTHER NAME/K LOCATI OTHER NAME/K	LOCATI OTHER LOCATI OTHER LOCATI OTHER LOCATI OTHER NAME/K	OTHER OTHER OTHER NAME/K LOCATI	; OTHER NAME/K NAME/K NAME/K	OTHER OTHER NAME/K LOCATI OTHER NAME/K LOCATI	; OTHER ; NAME/K ; LOCATI ; OTHER ; NAME/K	; OTHER; NAME/K; LOCATION OTHER; NAME/K; LOCATION NAME/K;	NAME/K LOCATI OTHER NAME/K LOCATI	NAME/K LOCATI OTHER NAME/K LOCATI	OTHER NAME/K LOCATI OTHER NAME/K NAME/K
	LOCATION: ( OTHER INFORM NAME/KEY: m LOCATION: ( COTHER INFORM OTHER INFORM	LOCATION: ( OTHER IMPOR NAME/KEY: m LOCATION: ( OTHER IMPOR NAME/KEY: m NAME/KEY: m	NAME/KEY: IN OTHER INFOR NAME/KEY: IN OTHER INFOR OTHER INFOR OTHER INFOR NAME/KEY: INFOR NAME	OTHER INFOR NAME/KEY: m LOCATION: ( OTHER INFOR	OTHER INFOR NAME/KEY: m LOCATION: () OTHER INFOR NAME/KEY: m	OTHER INFOR NAME/KEY: m ; LOCATION: ( ; LOCATION : ( ; LOCATION : ( ; LOCATION : ( ) LOCATION : (	OTHER INFOR  NAME/KEY: m  LOCATION: ( OTHER INFOR  NAME/KEY: m		OTHER INFOR	NAME/KEY: M LOCATION: ( OTHER INFOR NAME/KEY: M LOCATION: (	OTHER INFOR NAME/KEY: m LOCATION: () OTHER INFOR NAME/KEY: m LOCATION: () COTTON: () COT
misc (319) RMATI misc (346) (346) RMATI RMATI RMATI	LOCATION: (259) COTHER INFORMATIC NAME/KEY: misc_f LOCATION: (305) COTHER INFORMATIC	IOCATION: (246) OTHER INFORMATIC NAME/KEY misc (251) LOCATION: (251) OTHER INFORMATIC NAME/KEY: misc (	NAME/KEY: misc in LOCATION: (241) LOCATION: (241) OTHER INFORMATIC NAME/KEY: misc for LOCATION: (242) LOCATION: (242) OTHER INFORMATIC NAME/KEY: misc for NAME/KEY: misc for LOCATION: Under LOCATION: (242) L	OTHER INFORMATIC , OTHER INFORMATIC , NAME/KEY: misc_f , LOCATION: (239); , LOCATION: (37); , OTHER INFORMATIC	OTHER INFORMATIC  NAME/KEY: misc [225]  LOCATION: (225)  OTHER INFORMATIC  NAME/KEY: misc f	OTHER INFORMATION NAME/KEY: misc_f; LOCATION: (183) COTHER INFORMATION: (183) NAME/KEY: misc_f; LOCATION: (223)	; OTHER INFORMATIC ; NAME/KEY: misc_f ; LOCATICO: (157); ; OTHER INFORMATIC ; NAME/KEY: misc_f ; LOCATICO: (159);	OTHER INFORMATIC NAME/KEY misc (153) LOCATION: (153) OTHER INFORMATIC NAME/KEY: misc (154) LOCATION: (154)	OTHER INFORMATIO  NAME/KEY: misc (148)  LOCATION: (148)  OTHER INFORMATIO  NAME/KEY: misc (150)  LOCATION: (150)	NAME/KEY: misc f IOCATION: (114) OTHER INFORMATICA NAME/KEY: misc f IOCATION: (117)	OTHER INFORMATIO NAME/KEY: misc_f LOCATION: (109) OTHER INFORMATIO NAME/KEY: misc_f LOCATION: (112)
misc fea (319)( RMATION: misc fea (346)( RMATION: RMATION: RMATION:	LOCATION: (259)(259 COMMER INFORMATION: TE NAME/KEY: misc_featur LOCATION: (305)(305) COTHER INFORMATION: Th	(246)() RMATION: RMATION: Misc feat (251)() RMATION: RMATION:	NAME/KEY: misc reacus  LOCATION: (241)(241)  LOCATION: (1241)(241)  OTHER INFORMATION: Th  NAME/KEY: misc featus  LOCATION: (242)(242)  OTHER INFORMATION: Th  NAME/KEY: misc featus	OTHER INFORMATION: TH OTHER INFORMATION: Cy OTHER INFORMATION: Cy NAME/KEY: misc_featur LOCATION: (239)(239) JOCHER INFORMATION: Th	RMATION: nisc_feat (225)() RMATION: nisc_feat	RMATION: misc fea (183) RMATION: RMATION: misc fea (223)	; OTHER INFORMATION: Th  ; NAME/KEY: misc_featur ; LOCATION: (157)(157) ; OTHER INFORMATION: Th  ; NAME/KEY: misc_featur ; LOCATION: (159)(159)	OTHER INFORMATION: THE NAME   NEW   MANEY   MEST   MISS   Geatur   LOCATION: (153) (153)   OTHER INFORMATION: THE NAME   NEW   MANEY   MEST   MISS   MEST   MISS   MEST   MES	OTHER INFORMATION: The AMABY KEEL MISS. Feature LOCATION: (148)(148) OTHER INFORMATION: The AMABY KEEL MISS. Feature LOCATION: (150)(150)	NAME/KEY: misc feature in LOCATION: (114)(114)(114)(114)(114)(114)(114)(114)(114)(114)(114)(114)(117)(117)(117)(117)(117)	OTHER INFORMATION: The NAME/KEY: misc_featur LOCATION: (109)(109) COTHER INFORMATION: The NAME/KEY: misc_featur LOCATION: (112)(112)(112)
(319) .(319) (319) .(319) RMATION: The misc feature (346) .(346) RMATION: The RMATION: Stop misc_feature	(259)(259)  RMATION: The misc feature (305)(305)  RMATION: The	(246)(246)  RMATION: The misc feature (251)(251) RMATION: The misc feature	nisc reacure (241)(241) RMATION: The misc feature (242)(242) RMATION: The misc feature	RMATION: The RMATION: Cys, nisc feature (239) (239) RMATION: The	RMATION: The misc feature (225)(225) RMATION: The misc feature (237)	RMATION: The misc feature (183)(183) RMATION: The misc feature (223)(223)	RMATION: The misc feature (157). (157) RMATION: The misc feature (159). (159)	misc feature (153)(153) The misc feature misc feature (154)(154)		misc feature (114)(114) ORMATION: The misc feature (117)(117)	
(319). (319) (319). (319) RMATION: The 'Xaa' at the 'Xaa'	(259)(259)  RMATION: The 'Xaa' misc_feature (305)(305)	(246)(246) RMATION: The 'Xaa' misc feature (251)(251). RMATION: The 'Xaa' misc feature	nisc reacure (241) . (241) RVATION: The 'Xaa' nisc feature (242) . (242) RWATION: The 'Xaa'	RMATION: Cys, or Ph misc feature (239)(239)	RMATION: The 'Xaa' misc feature (225)(225) RMATION: The 'Xaa' misc feature (237) (237)	RMATION: The 'Xaa' misc_feature (183). (183) RRMATION: The 'Xaa' misc_feature (223). (223)	RMATION: The 'Xaa' misc feature fature misc feature misc feature fature flag (159) (159)	misc feature (153)(153) The 'Xaa' misc feature (154)(154)	Xaa Xaa	'Xaa'	X 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
misc feature (319) . (319) RMATION: The 'Xaa' at misc feature (346) . (346) RMATION: The 'Xaa' at RMATION: stop codon, Tarkarion, The 'Xaa' at RMATION: stop codon, Tarkarion, T	(259)(259) (259)(259) (259)(259) misc feature (305)(305) RMATION: The 'Xaa' at	(246)(246)  RMATION: The 'Xaa' at misc feature (251)(251)  RMATION: The 'Xaa' at misc feature	(241). (241) (241) . (241) RVATION: The 'Xaa' at misc feature (242). (242). RWATION: The 'Xaa' at misc feature	EVALUATION: The 'Xaa' at RMATION: Cys, or Phe. misc feature (239)(2	xWATION: The 'Xaa' at nisc feature (225). (225) at 2MATION: The 'Xaa' at nisc feature (237)	RMARION: The 'Xaa' at misc feature (183). (183) RRMATION: The 'Xaa' at misc feature (223). (223)	RMATION: The 'Xaa' at misc feature (157)(157) RMATION: The 'Xaa' at misc feature (159)(159)	misc feature (154)(154) at misc feature misc feature (154)(154)	'Xaa' at	'Xaa' at	Xaa at
misc feature (319) . (319) RMATION: The 'Xaa' at misc feature (346) . (346) RMATION: The 'Xaa' at RMATION: stop codon, Tarkarion, The 'Xaa' at RMATION: stop codon, Tarkarion, T	(259)(259)  RMATION: The 'Xaa' misc_feature (305)(305)	(246)(246)  RMATION: The 'Xaa' at misc feature (251)(251)  RMATION: The 'Xaa' at misc feature	nisc reacure (241) . (241) RVATION: The 'Xaa' nisc feature (242) . (242) RWATION: The 'Xaa'	RMATION: Cys, or Ph misc feature (239)(239)	RMATION: The 'Xaa' misc feature (225)(225) RMATION: The 'Xaa' misc feature (237) (237)	RMATION: The 'Xaa' misc_feature (183). (183) RRMATION: The 'Xaa' misc_feature (223). (223)	RMATION: The 'Xaa' misc feature fature misc feature misc feature fature flag (159) (159)	misc feature (154)(154) at misc feature misc feature (154)(154)	'Xaa' at	'Xaa' at	Xaa at
(319). (319) (319). (319)  RMATION: The 'Xaa' at location 319  RMATION: The 'Xaa' at location 319  RMATION: The 'Xaa' at location 346  RMATION: stop codon, Trp, or Ser.  misc_feature	(259)(259)  RMARION: The 'Xaa' at location 259  RMARIOF feature (305)(305)  RMARION: The 'Xaa' at location 305	(246)(246) (246)(246) RISC feature (251)(251) (251)(251) RISC feature (251)(251)	n.sc resture (241). (241) RVATION: The 'Xaa' at location 241 nisc feature (242). (242). RRATION: The 'Xaa' at location 242 nisc feature	RMATION: The 'Xaa' at location 237 NATION: Cys, or Phe. The Cys, or Phe. (239). (239). (239). (239) XAATION: The 'Xaa' at location 239	MATION: The 'Xaa' at location 223 misc feature (225)(225) MATION: The 'Xaa' at location 225 misc feature (237)	RMATION: The 'Xaa' at location 159 misc feature (183). (183) RMATION: The 'Xaa' at location 183 misc feature (223). (223)	RMATION: The 'Xaa' at location 154 misc_feature (157)(157) RMATION: The 'Xaa' at location 157 misc_feature (159). (159)	misc feature (153). (153) (153). (153) (153) (153) misc feature (154). (154)	'Xaa' at location 117	'Xaa' at location 114	'Xaa' at location 103 'Xaa' at location 109
misc feature (319). (319) start location 319 smAnTION: The 'Xaa' at location 319 smisc feature (346). (346) start location 346 smAnTION: The 'Xaa' at location 346 smAnTION: stop codon, Trp, or Ser. misc_feature	(259). (259) (259). (259) (259). (259)  RMATION: The 'Xaa' at location 259 s  RMATION: The 'Xaa' at location 305 s	(246)(246) (Xaa' at location 246 shrArION: The 'Xaa' at location 246 shrArION: The 'Xaa' at location 251 shrArION: The 'Xaa' at location	n.sc resture (241). (241) RVATION: The 'Xaa' at location 241 nisc feature (242). (242). RRATION: The 'Xaa' at location 242 nisc feature	RMATION: The 'Xaa' at location 237 s RMATION: Cys, or Phe. RMATION: Cys, or Phe. (239)(239) RMATION: The 'Xaa' at location 239 s	MATION: The 'Xaa' at location 223 misc feature (225)(225) MATION: The 'Xaa' at location 225 misc feature (237)	RMATION: The 'Xaa' at location 159 misc feature (183). (183) RMATION: The 'Xaa' at location 183 misc feature (223). (223)	RMATION: The 'Xaa' at location 154 misc_feature (157)(157) RMATION: The 'Xaa' at location 157 misc_feature (159). (159)	misc feature (153). (153) (153). (153) (153) (153) misc feature (154). (154)	'Xaa' at location 117	'Xaa' at location 114	'Xaa' at location 103 'Xaa' at location 109
(319). (319) (319). (319)  RMATION: The 'Xaa' at location 319 stands f  RMATION: The 'Xaa' at location 346 stands f  RMATION: Stop codon, Trp, or Ser.  misc_feature	(259). (259)  (259). (259)  MINATION: The 'Xaa' at location 259 stands misc feature (305). (305)  RMATION: The 'Xaa' at location 305 stands	(246)(246) (246)(246) (250)(251) (251)(251) (251)(251) (251)(251) (251)(251)	nisc resture (241). (241) (241) (241) (241) (241) (242) (242). (242). (242). (242). (242)	RMATION: The 'Xaa' at location 237 stands NATION: Cys, or Phe. NATION: Cys, or Phe. (239)(239) RMATION: The 'Xaa' at location 239 stands	MATION: The 'Xaa' at location 223 stands nisc feature (225)(225) MATION: The 'Xaa' at location 225 stands misc feature (237)	RMATION: The 'Xaa' at location 159 stands f misc feature (183). (183) RMATION: The 'Xaa' at location 183 stands f misc feature (223). (223)	RMATION: The 'Xaa' at location 154 stands misc feature (157)(157) RMATION: The 'Xaa' at location 157 stands misc feature (159)(159)	misc feature (153).(153) stands (153).(153) (153) stands (154).(154)	'Xaa' at location 117 stands	'Xaa' at location 114 stands	'Xaa' at location 103 stands 'Xaa' at location 109 stands
(319). (319) (319) (319). (319) stands for RMATION: The 'Xaa' at location 319 stands for (3146) (346)	(259). (259) (259). (259) REMATION: The 'Xaa' at location 259 stands for (305). (305) RMATION: The 'Xaa' at location 305 stands for	(246)(246) (246)(246) (246)(246)  misc feature (251)(251) (251)(251) (251)(251) (251)(251) (251)(251)	nusc reature (241). (241) Repairs for RMATION: The 'Xaa' at location 241 stands for misc feature (242). (242). (242). RMATION: The 'Xaa' at location 242 stands for misc feature	RMATION: The 'Xaa' at location 237 stands for NMATION: Cys, or Phe.  NMATION: (25), or Phe. (239)(239)  RMATION: The 'Xaa' at location 239 stands for NMATION: The 'Xaa' at location 239 stands for	MATION: The 'Xaa' at location 223 misc feature (225)(225) MATION: The 'Xaa' at location 225 misc feature (237)	RMATION: The 'Xaa' at location 159 stands for misc feature (183). (183) RMATION: The 'Xaa' at location 183 stands for misc feature (223). (223)	RMATION: The 'Xaa' at location 154 stands for misc feature (157)(157) RMATION: The 'Xaa' at location 157 stands for RMATION: The 'Xaa' at location 157 stands for (159)(159)	MRMATION: The 'Xaa' at location 150 stands for (153)(153) RMATION: The 'Xaa' at location 153 stands for misc feature (154)(154)	'Xaa' at location 117 stands for 'Xaa' at location 148 stands for	'Xaa' at location 114 stands for	'Xaa' at location 103 stands 'Xaa' at location 109 stands
misc feature (319). (319) (319). (319) (319). (319) (319) (319) (316) (3	(259). (259) (259). (259) (259). (259)  MIAGTION: The 'Xaa' at location 259 stands for Leu, or misc feature (305). (305)  RMATION: The 'Xaa' at location 305 stands for Leu.	(246)(246) (246)(246) RISC feature RISC feature (251)(251) RISC feature (251)(251) RISC feature RISC feature	nusc reature (241). (241) RVATION: The 'Xaa' at location 241 stands for Val. misc feature (242). (242). RNATION: The 'Xaa' at location 242 stands for Val, misc feature	RMATION: The 'Xaa' at location 237 stands for Ser, NMATION: Cys, or Phe.  NMATION: Cys, or Phe.  (239)	WANTION: The 'Xaa' at location 223 stands for nisc feature 'Xaa' at location 225 stands for WANTION: The 'Xaa' at location 225 stands for insc feature '7377' (237)	RMATION: The 'Xaa' at location 159 stands for misc feature (183). (183) RMATION: The 'Xaa' at location 183 stands for misc feature (223). (223)	RMATION: The 'Xaa' at location 154 stands for Giu, or misc feature (157)(157) RMATION: The 'Xaa' at location 157 stands for Ser, Giunisc feature (159)(159)	MRMATION: The 'Xaa' at location 150 stands for Fro. (153). (153) (153) (153) (153) (154) (154) (154). (154)	'Xaa' at location 117 stands for 'Xaa' at location 148 stands for	'Xaa' at location 114 stands for Arg,	'Xaa' at location 103 stands for Arg, or 'Xaa' at location 109 stands for Thr, Ale
misc feature (319). (319) (319). (319) (319). (319) (319) (319) (316) (3	(259)(259) (259)(259) (259)(259) misoc feature (305)(305) RMATION: The 'Xaa' at location 305 stands for Leu.	(246)(246) (246) (246) (246) (246) (246) (246) (246) (246) (251) (2	nisc reature (241) (241) RVATION: The 'Xaa' at location 241 stands for Val. misc feature (242) (242) (242) (242) (242) (242) RVATION: The 'Xaa' at location 242 stands for Val, Leu, or misc feature	RMATION: The 'Xaa' at location 237 stands for Ser, Thr, NATION: Cys, or Phe.  NIST feature (239)(239) RMATION: The 'Xaa' at location 239 stands for Val.	WANTION: The 'Xaa' at location 223 stands for nisc feature 'Xaa' at location 225 stands for WANTION: The 'Xaa' at location 225 stands for insc feature '7377' (237)	RMATION: The 'Xaa' at location 159 stands for misc feature (183). (183) RMATION: The 'Xaa' at location 183 stands for misc feature (223). (223)	RMATION: The 'Xaa' at location 154 stands for Giu, Of Asp. misc_feature (157)(157) RMATION: The 'Xaa' at location 157 stands for Ser, Gly, or RMATION: The 'Xaa' at location 157 stands for Ser, Gly, or misc_feature (159)(159)	MRMATION: The 'Xaa' at location 150 stands for Fro. misc feature (153). (153) (153) (153) (153) (153) (154) (154). (154)	'Xaa' at location 117 stands for 'Xaa' at location 148 stands for	'Xaa' at location 114 stands for Arg, or Ser.	'Xaa' at location 103 stands for Arg, or Ser. 'Xaa' at location 109 stands for Thr, Ala, or
misc feature (319). (319) (319). (319) (319). (319) (319) (319) (316) (3	(259). (259) (259). (259) (259). (259)  MIAGTION: The 'Xaa' at location 259 stands for Leu, or misc feature (305). (305)  RMATION: The 'Xaa' at location 305 stands for Leu.	(246)(246) (246)(246) (246)(246)  RISC feature (251)(251) (251)(251)  RISC feature (251)(251)	nisc reature (241) (241) RWATION: The 'Xaa' at location 241 stands for Val. misc feature (242) (242) (242) (242) (242) (242) RWATION: The 'Xaa' at location 242 stands for Val, Leu, misc feature	RMATION: The 'Xaa' at location 237 stands for Ser, NMATION: Cys, or Phe.  NMATION: Cys, or Phe.  (239)	WANTION: The 'Xaa' at location 223 stands for nisc feature 'Xaa' at location 225 stands for WANTION: The 'Xaa' at location 225 stands for insc feature '7377' (237)	RMATION: The 'Xaa' at location 159 stands for misc feature (183). (183) RMATION: The 'Xaa' at location 183 stands for misc feature (223). (223)	RMATION: The 'Xaa' at location 154 stands for GLU, or As misc feature (157)(157) RMATION: The 'Xaa' at location 157 stands for Ser, Gly, RMATION: The 'Xaa' at location 157 stands for Ser, Gly, (159)(159)	misc feature (153). (153) (153). (153) (153). (153) (153). (153) (154). (154)	'Xaa' at location 117 stands for 'Xaa' at location 148 stands for	'Xaa' at location 114 stands for Arg, or Ser.	'Xaa' at location 103 stands for Arg, or Se 'Xaa' at location 109 stands for Thr, Ala,

Pro, a

600 600

720

720

660 660

```
Query Match
Best Local Sim
Matches 551;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              COATION: (557).. (557)
OTHER INFORMATION: The 'Xaa' a NAME/KRY: misc feature LOCATION: (558).. (558)
OTHER INFORMATION: The 'Xaa' a
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      NAME/KEY: misc feature
LOCATION: (518]..(518)
OTHER INFORMATION: The 'Xaa' a
NAME/KEY: misc feature
LOCATION: (536]..(536)
OTHER INFORMATION: The 'Xaa' a
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          LOCATION: (411)...(411)
OTHER IMPORMATION: The 'NAME/KEY: misc_feature
LOCATION: (421)...(421)
OTHER INFORMATION: The '
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            OTHER INFORMATION: feature NAME/KEY: misc feature for formation: (556)...(556)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     NAME/KEY: misc feature LOCATION: (493)...(493) OTHER INFORMATION: The
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     NAME/KEY: misc feature LOCATION: (487)...(487) OTHER INFORMATION: The
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           NAME/KEY: misc feature LOCATION: (466)..(466)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      NAME/KEY: misc feature LOCATION: (557)..(557)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         OTHER INFORMATION: The
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             OTHER INFORMATION: The
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            OTHER INFORMATION: The
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          NAME/KEY: misc_feature
LOCATION: (458)..(458)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              OTHER INFORMATION: The
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             NAME/KEY: misc_feature
LOCATION: (457)..(457)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Similarity
                                                                                                                                                                                                               XHEGXEKIMXAREAIALXGLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLSQ
                                                                                                                                                                                                                                                                                                                                                                        GFGGSADTRTEDAVSLQKALIEHQLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIRVN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   misc_feature
              XAVANTMEXTRLALALIGKLNFTQLTEMLNAGMNRGXXSCLAAEDXSLSYHCKGLDIAAA
                                                                                                                                                                                                                                      VLHEGTEKIMFAREAISLFGLEAVVLGPKEGLGLVNGTAVSASMATLSLHDSHMLSLLSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      MAPSLDSLATTLANGFTNGSHAAPTKSAAGPTSALRRTPGLDGHAAHQSQLEIVQELLSD
                                               SAVSISMEKTRIALALIGKINFTOCTELLNAAMNRGLPSCLAAEDPSINYHGKGLDIHIA 480
                                                                                                              EGILRODRYPLRTSPOFLGPLVEDMMHAYSTLSLENNTTTDNPLLDVENKOTAHGGNFOA
                                                                                                                                                   ALTAXTVEAMVGHAGSFHXFLHDVTRPHPTQIEVARNIRTLLEGSXFAVHHEEEVKVKDD
                                                                                                                                                                        ALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEVKVKVDD
                                                                                                                                                                                                                                                                                  SLXRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSXLXYIAAAITGHPDXKXH
                                                                                                                                                                                                                                                                                                                 SLTRGHSAVRLVVLEALTNFLNHRITPIVPLRGSISASGDLSPLSYIAGAITGHPDVKVH
                                                                                                                                                                                                                                                                                                                                                   GFGGSADTRTEDAISLQKALLEHQLCGXLXTSXXSFXLXRGLENSLPLEVVRGAMTIRVN
                                                                                                                                                                                                                                                                                                                                                                                                                  PTDDXXELDGYTLTLXDVVGAARKGRXVRVQTXDEIRAKIDXXVEFLRXQLXNXVYXVTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                     PTDDVVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSVYGVTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      MAPSXDSTATSXANGXXNXXHAAPXKXXTGATSXLXRPXXLAPPATQXTQLDIXEXILAD
                                                                               EGILRODRYPLRTSPOWLGPLVSDMIHAHAVLSLEAESTTDNPLIDVENKXTHHGGNFOA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          . (457)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  75.6%;
76.5%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      'Xaa' at
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           'Xaa'
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          'Xaa'
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           'Xaa'
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          'Xaa'
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           'Xaa'
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             'Xaa'
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            'Xaa'
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              'Xaa'
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       45;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      at
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        at
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           at
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          at
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           at
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            a)
CT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         at
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           a
C
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              at
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              at
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             a
C
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Score 2730; DB 24;
Pred. No. 3.7e-258;
5; Mismatches 124;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      location 558
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            location 411
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      location
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           location
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        location
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         location
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           location
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          location
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           location
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              location
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             location
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            location
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         556
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        536
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           518
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             466
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            458
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      557
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           493
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          487
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              457
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           421
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      stands
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            stands
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      stands
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         stands
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        stands
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           stands
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           stands
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           stands
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           stands
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          stands
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              stands
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           stands
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        for
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      for
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          for
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           for Lys,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         for
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        for
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           for Val
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          for
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           for
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           for
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            for
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           for
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Met,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Thr,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ile,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Gly
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Pro
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Val
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Thr,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Leu
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ala,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Val,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ile,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       0
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ala,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Thr,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Val,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        ö
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             ö
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            õ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      or Leu
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Pro
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Met
                                                                                                                420
                                                                                                                                                                                                                 300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       or Leu.
                 480
                                                                               420
                                                                                                                                                 360
                                                                                                                                                                                 360
                                                                                                                                                                                                                                                  300
                                                                                                                                                                                                                                                                                  240
                                                                                                                                                                                                                                                                                                                 240
                                                                                                                                                                                                                                                                                                                                                   180
                                                                                                                                                                                                                                                                                                                                                                                                                    120
                                                                                                                                                                                                                                                                                                                                                                                                                                                     120
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        9
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       0
                        Ş
                                                                 뮍
                                                                                           Ş
                                                                                                                                밁
                                                                                                                                                          Ş
                                                                                                                                                                                                                             Ş
                                                                                                                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                            δÃ
                                                                                                                                                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                                                                                                                               Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                Ş
                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     RESULT 7
PCT-US02-26934A-19
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    δõ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       PCT-US02-26934A-19
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Query Match
Best Local Similarity
Matches 522; Conserv
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    SOFTWARE: PatentIn Ver. 2.0
SEQ ID NO 19
LENGTH: 716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Sequence 19, Application GENERAL INFORMATION: APPLICANT: PCBU Services
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    FILE REFERENCE: 29479/500NSCA PCT
CURRENT APPLICATION NUMBER: PCT/U802/26934A
CURRENT FILING DATE: 2002-08-23
PRIOR APPLICATION NUMBER: US 09/939,408
PRIOR FILING DATE: 2001-08-24
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      APPLICANT: PCBU Services, Inc. et al.
TITLE OF INVENTION: Phenylalanine Ammonia Lyase Polypeptide and
TITLE OF INVENTION: Polypuncleotide Sequences and Methods of Obtaining
TITLE OF INVENTION: Using Same
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       NUMBER OF SEQ ID NOS: 30
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       TYPE: PRT ORGANISM: Rhodotorula toruloides
                                                                                             361
                                                                                                                                                                                                                                                                  175
                               420
                                                                 355
                                                                                                                                                                 301
                                                                                                                                                                                                                                  241
                                                                                                                                                                                                                                                                                                                                   115
                                                                                                                                295
                                                                                                                                                                                                   235
                                                                                                                                                                                                                                                                                                 181
                                                                                                                                                                                                                                                                                                                                                                  121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          661
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        661
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         109
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         601
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            541
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           481
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           481
                                                                                                                                                                                                                                                                                                                                                                                                    ភ
                                                                                                                                                                                                                                                                                                                                                                                                                                   61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Н
                                                                                                                                                                                                                                                                                                                                                                 GFGGSADTRTEDAVSLOKALIEHOLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIRVN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    MAPSIDSLATTLANGFTNGSHAAPTKSAAGPTSALRRTPGIDGHAAHQSQLEIVQELLSD
                        ASAVSISMEKTRLALIGKLNFTQCTELLNAAMNRGLPSCLAAEDPSLNYHGKGLDIHI
                                                                                                                                                       ALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEVKVKDD
AAAVANTMEKTRIGIAQIGKINFTQITEMINAGMNRGIPSCIAAEDPSISYECKGIDIAA
                                                                                           EGILRQDRYPLRTSPQFLGPLVEDMMHAYSTLSLE-NNTTTDNPLLDVENKQTAHGGNFQ
                                                                                                                                                                                                                                VLHEGTEKIMFAREAISLFGLEAVVLGPKEGLGLVNGTAVSASMATLSLHDSHMLSLLSQ
                                                                                                                                                                                                                                                                                                                               GFGGSADTRTEDAISLQKALLEHQLCGVLPSSFDSFRLGRGLENSLPLEVVRGAMTIRVN
                                                                                                                                                                                                                                                                                                                                                                                                                                  PTDDVVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSVYGVTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                     MAPSLDSISHSFANG-----VASAKQAVNGASTNLAVAGSHLPTTQVTQVDIVEKMLAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          SLTAMTVEAMVGHAGSFHPFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEVKVKDD
                                                                                                                                                                                                 VVHEGKEKILYAREAMALFNLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLSQ
                                                                                                                                                                                                                                                                  SLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAISGHPDSKVH
                                                                                                                                                                                                                                                                                                SLTRGHSAVRLVVLEALTNFLNHRITPIVPLRGSISASGDLSPLSYIAGAITGHPDVKVH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           AYTSELXHLANPXTTHVQPRENGNQAVNSLALISARRXAEANDVLSLLLATHLYCXLQAV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     AYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQAV
                                                               EGILRODRYPLRTSPOWLGPLVSDLIHAHAVLTIEAGQSTTDNPLIDVENKTSHHGGNFQ
                                                                                                                                                                                                                                                                                                                                                                                                  PTDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        YLSPRTRVLYSFVREELGVKARRGDVFLGKQEVTIGTNVSRIYEAIKXGXINHVLVKMLA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    YLSPRTRVLYSFVREBLGVQARRGDVFVGVQQETIGSNVSRIYBAIKDGRINHVLVKMLA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       AFSFATGTVVELLSSSXXAKVSLAAVNAWKVASAEKAISLTRXVRDXFWXAPSSSSPALX
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       AFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAISLTREVRNRFWQTPSSQAPAHA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    72.4%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         PC/TUS0226934A
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      86; Mismatches 103;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Score 2614; DB 1;
Pred. No. 9.5e-247;
```

Length 716; Indels 14;

Gaps

240

174 180 120 54

114

234

479

414

474

419

360

294 300

354

NAME/KEY:

-

Ş

В

Ş

밁 S 밁 Ş B

g D S 멂

421 421 361 361 301 301 241 241 181 181 121 121 61 5

Š 밁 δÃ 뮍 Ś

711

595

594

539 474 479

534

```
GENERAL INFORMATION:
APPLICANT: E.I. DUPONT de Nemours and Company, Inc.
APPLICANT: E.I. DUPONT de Nemours and Company, Inc.
ITILE OF INVENTION: METHOD FOR THE RECOMBINATION OF GEN
FILE REFERENCE: CL1794 PCT
CURRENT APPLICATION NUMBER: PCT/US03/05708
CURRENT FILING DATE: 2003-02-26
PRIOR APPLICATION NUMBER: 60360,279
PRIOR FILING DATE: 2002-02-26
NUMBER OF SEQ ID NOS: 203
SOPTWARE: Patentin version 3.2
LENGTH: 716
                                                                 밁
                                                                                                Ş
                                                                                                                                     밁
                                                                                                                                                         Ş
                                                                                                                                                                                               D,
                                                                                                                                                                                                                                                                                        8
                                                                                                                                                                                                                                                                                                                              g
                                                                                                                                                                                                                                                                                                                                                    8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         B & B &
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         유 성
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                    S
                                                                                                                                                                                                                            5
                                                                                                                                                                                                                                                               뮍
                                                                                                                                                                                                                                                                                                                                                                                        В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          RESULT 8
PCT-US03-05708-2
; Sequence 2, Ap
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     ð
                                                                                                                                                                                                                                                                                                                                                                                                                      S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       PCT-US03-05708-2
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Query Match
                                                                                                                                                                                                                                                                                                                                                                                                                                                         Matches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               TYPE: PRT ORGANISM: Rhodosporidium glutinis
                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Local
               355
                                           361
                                                                         295
                                                                                                       301
                                                                                                                                       235
                                                                                                                                                                   241
                                                                                                                                                                                                    175
                                                                                                                                                                                                                                  181
                                                                                                                                                                                                                                                                  115
                                                                                                                                                                                                                                                                                              121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      652
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    656
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  596
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                535
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               475
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            480
                                                                                                                                                                                                                                                                                                                                55
                                                                                                                                                                                                                                                                                                                                                            9
                                                                                                                                                                                                                                                                                                                                                                                            ш
                                                                                                                                                                                                                                                                                                                                                                                                                           Н
                                                                                                                                                                                                                                                                                                                                                                                                                                                      h 72.4%; Score 2614; DB 1; Similarity 72.0%; Pred. No. 9.5e-247; 22; Conservative 86; Mismatches 103;
                                                                                                                                                                                                                                                                                                                                                                                                           MAPSIDSLATTLANGFTNGSHAAPTKSAAGPTSALRRTPGLDGHAAHQSQLEIVQELLSD
                              EGILRODRYPLRTSPOFLGPLVEDMMHAYSTLSLE-NNTTTDNPLLDVENKQTAHGGNFQ 419
                                                                                               ALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEVKVKDD
                                                                                                                                                              VLHEGTEKIMFAREAISLFGLEAVVLGPKEGLGLVNGTAVSASMATLSLHDSHMLSLLSQ
                                                                                                                                                                                                                       SLTRGHSAVRLVVLEALTNFLNHRITPIVPLRGSISASGDLSPLSYLAGAITGHPDVKVH
                                                                                                                                                                                                                                                                GFGGSADTRTEDAISLQKALLEHQLCGVLPSSFDSFRLGRGLENSLPLEVVRGAMTIRVN
                                                                                                                                                                                                                                                                                 GFGGSADTRTEDAVSLQKALIEHQLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIRVN
                                                                                                                                                                                                                                                                                                                              PTDDVVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSVYGVTT 120
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Application PC/TUS0305708
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          LKMLA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    SPALSYLSPRTQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNVL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    PRWHDAFSFAAGTVVEVLSST---SLSLAAVNAWKVAAAESAISLTRQVRETFWSAASTS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         PRWHDAFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAISLTREVRNRFWQTPSSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            VDLRAMELDFKKQFDFLLFTLLQQHLG---TGLDV-NALALEVKKALNKRLEQTTTYDLE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             AAYTSELGHLANPVTTHVQPAEMANQAVNSLALISARRTTESNDVLSLLLATHLYCVLQA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              AAYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQA
             EGILRQDRYPLRTSPQWLGPLVSDLIHAHAVLTIEAGQSTTDNPLIDVENKTSHHGGNFQ
                                                                           SLTAMTVEAMVGHAGSFHPFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEVKVKDD
                                                                                                                                       VVHEGKEKILYAREAMALFNLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLSQ
                                                                                                                                                                                                      SLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAISGHPDSKVH
                                                                                                                                                                                                                                                                                                                                                                                            MAPSIDSISHSFANG-----VASAKQAVNGASTNIAVAGSHIPTTQVTQVDIVEKMLAA 54
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      VKMLA 720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    APAHAYLSPRTRVLYSFVREELGVQARRGDVFVGVQQETIGSNVSRIYEAIKDGRINHVL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                IDLRATEFEFKKOFGPATVSLIDQHFGSAMTGSNLRDELVEKVNKTLAKRLEQTNSYDLV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Length 716;
                                                                                                                                                                                                                                                                                                                                                                                                                                                        Indels 14;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                GENETIC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                ELEMENTS
                                                                                                                                                                      300
                                                                                                                                                                                                                                                                                                  180
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  655
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               595
                                                                                                          360
                                                                                                                                        294
                                                                                                                                                                                                    234
                                                                                                                                                                                                                                    240
                                                                                                                                                                                                                                                                  174
                                                                                                                                                                                                                                                                                                                                                                                                                           60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        711
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    715
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    651
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 594
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               534
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             539
                                                                           354
                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ç
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Sequence 2, Application PC/TUS0317926
(GENERAL INFORMATION:
APPLICANT: B.I. du Pont de Nemours and Co.
ITILE OF INVENTION: Microbial Conversion of G
FILE REFERENCE: CL1912 PCT
CURRENT APPLICATION NUMBER: PCT/US03/17926
CURRENT FILING DATE: 2003-05-20
PRIOR APPLICATION NUMBER: 60/383450
PRIOR APPLICATION NUMBER: 60/383450
PRIOR FILING DATE: 2002-05-23
NUMBER OF SEQ ID NOS: 18
SOFTWARE: Microsoft Office 97
SEQ ID NO 2
LENGTH: 716
                                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                                               맑
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              RESULT 9
PCT-US03-17926-2
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               멍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              밁
                            맑
                                                        Ś
                                                                                 β
                                                                                                                   S
                                                                                                                                                      g
                                                                                                                                                                             Ş
                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                              Ş
                                                                                                                                                                                                                                                                                                             S
                                                                                                                                                                                                                                                                                                                                                                         Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    5
Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                            PCT-US03-17926-2
                                                                                                                                                                                                                                                                                                                                                                                                            Query Match
Best Local S
Matches 522
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    LENGTH: 716
TYPE: PRT
ORGANISM: Rhodotorula glutinis
                                                                                                                                                         175
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                475
                               295
                                                             301
                                                                                           235
                                                                                                                         241
                                                                                                                                                                          181 SLTRGHSAVRLVVLEALTNFLNHRITPIVFLRGSISASGDLSFLSYIAGAITGHFDVKVH
                                                                                                                                                                                                                     115
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         652
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       656
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             540 VDLRAMELDFKKQFDFLLFTLLQQHLG---TGLDV-NALALEVKKALNKRLEQTTTYDLE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            420
   361
                                                                                                                                                                                                                                                 121 GFGGSADTRTEDAVSLOKALIEHOLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIRVN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           716 VKMLA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             712 LKMLA
                                                                                                                                                                                                                                                                                   ហ
                                                                                                                                                                                                                                                                                                                                                                                                            al Similarity
522; Conserv
                                                                                                                                                                                                                                                                                                                 61
                                                                                                                                                                                                                                                                                                                                             1 MAPSIDSISHSFANG-----VASAKQAVNGASTNLAVAGSHLPTTQVTQVDİVEKMLAA
                                                                                                                                                                                                                                                                                                                                                                             1 MAPSIDSLATTLANGFTNGSHAAPTKSAAGPTSALRRTPGLDGHAAHQSQLEIVQELLSD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEVKVKDD
                                                                                                              GFGGSADTRTEDAISLQKALLEHQLCGVLPSSFDSFRLGRGLENSLPLEVVRGAMTIRVN
                                                                                                                                                                                                                                                                              PTDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDETRSKIDKSVEFLRSQLSMSVYGVTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                AAYTSELGHLANPVTTHVQPAEMANQAVNSLALISARRTTESNDVLSLLLATHLYCVLQA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 AAYASBLGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               ASAVSISMEKTRLALALIGKLNFTQCTELLNAAMNRGLPSCLAAEDPSLNYHGKGLDIHI
 EGILRQDRYPLRTSPQFLGPLVEDMMHAYSTLSLE-NNTTTDNPLLDVENKQTAHGGNFQ
                                                                                             VVHEGKEKILYAREAMALFNLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLSQ
                                                                                                                                                         SLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAISGHPDSKVH
                                                                                                                                                                                                                                                                                                               PTDDVVELSGYSLTVRDVVGAARKGRRVRVQUDDEIRARVDKSVDFLKAQLQNSVYGVTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       PRWHDAPSFAAGTVVEVLSST---SLSLAAVNAMKVAAAESAISLTRQVRETFWSAASTS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              AAAVANTMEKTRIGIAQIGKINFTQITEMINAGMNRGIPSCLAAEDPSISYHCKGIDIAA
                              SLTAMIVEAMVGHAGSFHPFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      PRWHDAFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAISLTREVRNRFWOTPSSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   IDLRAIBFEFKKOFGPAIVSLIDOHFGSAMTGSNLRDELVEKVNKTLAKRLEQTNSYDLV
                                                                                                                                                                                                                                                                                                                                                                                                              Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             720
                                                                                                                                                                                                                                                                                                                                                                                                            72.4%; Score 2614; DB 1; 72.0%; Pred. No. 9.5e-247; tive 86; Mismatches 103;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           a co.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Glucose to Para-Hydroxystyrene
                                                                                                                                                                                                                                                                                                                                                                                                                                          Length 716;
                                                                                                                                                                                                                                                                                                                                                                                                                Indels
```

14;

180

114

360 294 300 234 240 174

354

120

ت 4. 60

534

414

```
ž
                                       Я
                                                                            Ŋ
                                                                                                                   В
                                                                                                                                                     Ŋ
                                                                                                                                                                                                Я
                                                                                                                                                                                                                               ž
                                                                                                                                                                                                                                                                             Я
                                                                                                                                                                                                                                                                                                                ž
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      RESULT 10
US-09-939-408A-19
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               당
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ŕ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             D.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     á
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               ž
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                      JS-09-939-408A-19
                                                                                                                                                                                                                                                                                                                                                                                                                                                      NUMBER OF SEQ ID NOS: 30
SCFTMARE: PatentIn Ver. 2.0
SEQ ID NO 19
LENGTH: 716
TYPE: PRT
ORGANISM: Rhodotorula toruloides
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Sequence 19, Application US/09939408A
GENERAL INFORMATION:
APPLICANT: Yoshida, Roberta
APPLICANT: Kootstra, Anna
TITLE OF INVENTION: Pohyulalanine Ammonia Lyase Polypeptide and
TITLE OF INVENTION: Pohyucalectide Sequences and Methods of Obtaining
TITLE OF INVENTION: Using Same
                                                                                                                                                                                                                                                                                                                                                                            Query Match
Best Local Similarity
                                                                                                                                                                                                                                                                                                                                                           Matches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      FILE REFERENCE: 29479/500NSCA
CURRENT APPLICATION NUMBER: US/09/939,408A
CURRENT FILING DATE: 2001-08-24
PRIOR APPLICATION NUMBER: US 09/624,693
PRIOR TILING DATE: 2000-07-24
PRIOR APPLICATION NUMBER: PCT/US01/23270
PRIOR APPLICATION NUMBER: PCT/US01/23270
PRIOR FILING DATE: 2001-07-24
                                                                              181
                                                                                                                      115
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 652
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    656
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   596
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        535
    241 VLHEGTEKIMFAREAISLFGLEAVVLGPKEGLGLVNGTAVSASMATLSLHDSHMLSLLSQ 300
                                                                                                                                                           121
                                                                                                                                                                                                                                                                                                                                                       522;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  712 LKMLA 716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     475
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               415
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          355
                                                                                                                                                                                                  ភ
ភ
                                                                                                                                                                                                                                       9
                                                                                                                                                                                                                                                                             _
                                                                                                                                                                                                                                                                                                 1 MAPSIDSHATTLANGFINGSHAAPTKSAAGPTSALRRTPGLDGHAAHQSQLEIVQELLSD 60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              APAHAYLSPRTRVLYSFVREELGVQARRGDVFVGVQQETIGSNVSRIYBAIKDGRINHVL 715
                                       SLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAISGHPDSKVH
                                                         SLTRGHSAVRLVVLEALTNFLNHRITPIVPLRGSISASGDLSPLSYIAGAITGHPDVKVH 240
                                                                                                                      GFGGSADTRTEDAISLOKALLEHOLCGVLPSSFDSFRLGRGLENSLPLEVVRGAMTIRVN
                                                                                                                                          GFGGSADTRTEDAVSLQKALIEHQLCGVTFTSXSSFSVGRGLENTLPLEVVRGAMVIRVN 180
                                                                                                                                                                                                PTDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVTT
                                                                                                                                                                                                                   PTDDVVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSVYGVTT 120
                                                                                                                                                                                                                                                                           MAPSIDSISHSFANG-----VASAKQAVNGASTNLAVAGSHLPTTQVTQVDIVEKMLAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         VKMLA 720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               SPALSYLSPRIQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNVL 711
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       PRWHDAFSFAAGTVVEVLSST---SLSLAAVNAWKVAAAESAISLTRQVRETEWSAASTS 651
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      PRWHDAFSYATGTVVELLSSSDSANVTLTAVNAWKVASAEKAISLTREVRNRFWQTPSSQ 655
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    VDLRAMELDEKKOFDELLETILLOCHLG---TGLDV-NALALEVKKALNKRLECTTTYDLE 595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         AAYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQA 539
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         AAAVANTMEKTRLIGLAQIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  ASAVSISMEKTRLALALIGKLNFTQCTELLNAAMNRGLPSCLAAEDPSLNYHGKGLDIHI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                AAYTSELGHLANPVTTHVQPAEMANQAVNSLALISARRTTESNDVLSLLLATHLYCVLQA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      BGILRQDRYPLRTSPQWLGPLVSDLIHAHAVLTIEAGQSTTDNPLIDVENKTSHHGGNFQ
                                                                                                                                                                                                                                                                                                                                                           Conservative
                                                                                                                                                                                                                                                                                                                                                                          72.4%; Score 2614; DB 24; 72.0%; Pred. No. 9.5e-247;
                                                                                                                                                                                                                                                                                                                                                         86; Mismatches 103;
                                                                                                                                                                                                                                                                                                                                                                                            Length 716;
                                                                                                                                                                                                                                                                                                                                                         Indels
                                                                                                                                                                                                                                                                                                                                                       14;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  and
                                       234
                                                                                                                      174
                                                                                                                                                                                                114
                                                                                                                                                                                                                                                                             л
4,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                534
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             474
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        414
                                                                                                                                                                                                                                                                                                                                                                    Sequence 4, Application US/10138970A
GENERAL INFORMATION:
APPLICANT: Sariasiani, Sina
APPLICANT: Tang, Xiao-Song
APPLICANT: Qi, Wei Wei
FILE OF INVENTION: Methods for the Production of Tyrosine, Cinnamic Acid and Para
FITLE OF INVENTION: Mydroxycinnamic Acid
FILE REFERENCE: CL1777
CURRENT APPLICATION NUMBER: US/10/138,970A
CURRENT FILING DATE: 2002-07-23
NUMBER OF SEQ ID NOS: 24
SOFTWARE: Microsoft Office 97
SEQ ID NO 4
LENGTH: 716
TYPE: PRT
ORGANISM: C. violaceum
Ş
                                     밁
                                                                        Ś
                                                                                                               뮍
                                                                                                                                                Ş
                                                                                                                                                                                              밁
                                                                                                                                                                                                                               δÃ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                       US-10-138-970A-4
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            US-10-138-970A-4
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               뮍
                                                                                                                                                                                                                                                                           Query Match
Best Local Similarity
Matches 522; Conserv
                                                            121 GFGGSADTRTEDAVSLQKALIEHQLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIRVN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         712
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      652
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     596
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             535
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         475
    181 SLTRGHSAVRLVVLEALTNFLNHRITPIVPLRGSISASGDLSPLSYIAGAITGHPDVKVH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            716 VKMLA 720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         959
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                540 VDLRAMELDFKKQFDFLLFTLLQQHLG---TGLDV-NALALEVKKALNKRLEQTTTYDLE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      415 AAAVANTMEKTRLGLAQIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIAA 474
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                355
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        301 ALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEVKVKDD 360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      235 VVHEGKEKILYAREAMALFNLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLSQ
                                                                                                                   ហ
                                                                                                                                                         61
                                                                                                                                                                                                                                   1 MAPSIDSLATTLANGFTNGSHAAPTKSAAGPTSALRRTPGLDGHAAHQSQLEIVQELLSD
                                                                                                                   PIDSTLELDGYSLNLGDVVSAARKGREVRVXDSDEIRSKIDKSVEFLRSQLSMSVYGVTT
                                                                                                                                                PTDDVVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSVYGVTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        APAHAYLSPRTRVLYSFVREELGVQARRGDVFVGVQQETIGSNVSRIYEAIKDGRINHVL 715
                                       GFGGSADTRTEDAISLQKALLEHQLCGVLPSSFDSFRLGRGLENSLPLEVVRGAMTIRVN
                                                                                                                                                                                              MAPSLDSISHSFANG-----VASAKQAVNGASTNLAVAGSHLPTTQVTQVDIVEKMLAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      SPALSYLSPRIQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNVL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           EGILRQDRYPLRTSPQFLGPLVEDMMHAYSTLSLE-NNTTTDNPLLDVENKQTAHGGNFQ 419
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         LKMLA 716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     PRWHDAFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAISLTREVRNRFWQTPSSQ 655
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              AAYASELGHLANPYTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQA 539
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             ASAVSISMEKTRLALALIGKLNFTQCTELLNAAMNRGLPSCLAAEDPSLNYHGKGLDIHI 479
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           SLTAMTVEAMVGHAGSFHPFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEVKVKDD 354
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              PRWHDAFSFAAGTVVEVLSST---SLSLAAVNAWKVAAAESAISLTRQVRETEWSAASTS 651
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             IDLRAIEFEFKKOFGPAIVSLIDQHFGSAMTGSNLRDELVEKVNKTLAKRLEQTNSYDLV 594
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       AAYTSELGHLANPVTTHVQPAEMANQAVNSLALISARRTTESNDVLSLLLATHLYCVLQA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              EGILRODRYPLRTSPOWLGPLVSDLIHAHAVLTIEAGOSTTDNPLIDVENKTSHHGGNFO
                                                                                                                                                                                                                                                                             Conservative
                                                                                                                                                                                                                                                                         72.4%; Score 2614; DB 27; 72.0%; Pred. No. 9.5e-247; Vative 86; Mismatches 103;
                                                                                                                                                                                                                                                                             Indels
                                                                                                                                                                                                                                                                                                              Length 716;
```

240

180

174

120

54

S

Para-

114

```
APPLICANT: Tang, Xiao-Song
ITITLE OF INVENTION: BIOPRODUCTION OF PARA-HYDROXYCINNAMIC ACID
FILE REFERENCE: BC1009 US DIVCIP
CURRENT APPLICATION NUMBER: US/10/188,523B
CURRENT FILING DATE: 2002-10-17
PRIOR APPLICATION NUMBER: US 09/627,216
PRIOR APPLICATION NUMBER: US 09/627,216
PRIOR APPLICATION NUMBER: US 09/627,719
PRIOR APPLICATION NUMBER: US 60/147,719
PRIOR FILING DATE: 1999-08-06
NUMBER OF SEQ ID NOS: 38
SOFTWARE: Microsoft Office 97
SEQ ID NO 8
LENGTH: 716
TYPE: PRT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              RESULT 12
US-10-188-523B-8
                                                                                                                                                                                                                                                                                                                        ; ORGANISM: Rhodotorula glutinis
US-10-188-523B-8
                                                                                                                                                                                                                        Matches
                                                                                                                                                                                                                                             Query Match
Best Local Similarity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Sequence 8, Application US/10188523B GENERAL INFORMATION:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   712
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   652
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   656
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      596
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      535
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            475
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              415
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               355
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 295
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    235
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 241
                        55
                                                                  67
                                                                                                                     μ
                                                                                                                                                                     1 MAPSIDSLATTLANGFINGSHAAPTKSAAGPTSALRRTPGLDGHAAHQSQLEIVQELLSD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 APAHAYLS PRTRVLYS FVREELGVQARRGDVFVGVQQETIGSNVSRIYEAIKDGRINHVL
:||:|||||::||:||||||:||
SPALSYLS PRTQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNVL
                                                                PTDDVVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSVYGVTT 120
                                                                                                                     MAPSLDSISHSFANG-----VASAKQAVNGASTNLAVAGSHLPTTQVTQVDIVEKMLAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   LKMLA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   VKMLA 720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 PRWHDAFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAISLTREVRNRFWQTPSSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   IDLRAIEFEFKKQFGPAIVSLIDQHFGSAMTGSNLRDELVEKVNKTLAKRLEQTNSYDLV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 VDLRAMELDFKKQFDPLLFTLLQQHLG---TGLDV-NALALEVKKALNKRLEQTTTYDLE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         AAYTSELGHLANPVTTHVQPAEMANQAVNSLALISARRTTESNDVLSLLLATHLYCVLQA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      AAYASELGHILANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSILLASHLYCTLQA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            ASAVSISMEKTRLALALIGKLNFTQCTELLNAAMNRGLPSCLAAEDPSLNYHGKGLDIHI 479
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         EGILRQDRYPLRTSPQFLGPLVEDMMHAYSTLSLE-NNTTTDNPLLDVENKQTAHGGNFQ 419
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEVXVKDD 360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 VYHEGKEKILYAREAMALFNLEPVYLGPXEGLGLVNGTAVSASMATLALHDAHMLSLLSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  PTDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDXSVEFLRSQLSMSVYGVTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   PRWHDAPSFAAGTVVEVLSST---SLSLAAVNAWKVAAAESAISLTRQVRETFWSAASTS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 EGILRODRYPLRTSPOWLGPLVSDLIHAHAVLTIEAGQSTTDNPLIDVENKTSHHGGNFQ 414
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 SLTAMTVEAMVGHAGSFHPFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 VLHEGTEKIMFAREAISLFGLEAVVLGPKEGLGLVNGTAVSASMATLSLHDSHMLSLLSQ 300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            AAAVANTMEKTRLGLAQIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIAA
                                                                                                                                                                                                                        Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   716
                                                                                                                                                                                                                     72.4%; Score 2614; DB 27; 72.0%; Pred. No. 9.5e-247; tive 86; Mismatches 103;
                                                                                                                                                                                                                                                                  Length
                                                                                                                                                                                                                        Indels
                                                                                                                                                                                                                        14;
                                                                                                                                                                                                                     Gaps
                                                                                                                        54
                                                                                                                                                                        60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      715
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      65
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      655
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         594
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            539
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 354
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         711
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         534
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              474
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    294
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    234
                                                                                                                                                                                                             SEQUENCE 8, Application US/10188523C

GENERAL INFORMATION:
APPLICANT: Tang, Xiao-Song
ITILE OF INVENTION: BLOPRODUCTION OF PARA-HYDROXYCINNAMIC ACII
FILE REFERENCE: BC1009-CIP
CURRENT APPLICATION NUMBER: US/10/188,523C
CURRENT FILING DATE: 2002-10-24
PRIOR APPLICATION NUMBER: US 9/627,216
PRIOR APPLICATION NUMBER: US 9/627,216
PRIOR APPLICATION NUMBER: US 60/147,719
PRIOR APPLICATION NUMBER: US 60/147,719
PRIOR APPLICATION NUMBER: US 50/147,719
PRIOR APPLICATION NUMBER: US 60/147,719
PRIOR APPLICATION NUMBER: US 60/147,7
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      RESULT 13
US-10-188-523C-8
밁
                                        Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      .
Д
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                US-10-188-523C-8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Š
                                                                                          Query Match
Best Local S
Matches 522
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              535
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           652
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           656
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              596
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              475
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    415
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    355
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         295
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         235
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            175
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            115
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           712
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        716 VKMLA 720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            121
                                                                                             al Similarity 72.0
522; Conservative
                                             Н
۳.
                                        MAPSLDSLATTLANGFTNGSHAAPTKSAAGPTSALRRTPGLDGHAAHQSQLEIVQELLSD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            ALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTILSGSSFAVEHEEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         APAHAYLSPRTRVLYSFVREELGVQAREGDVFVGVQQETIGSNVSRIYEAIKDGRINHVL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           AAYASELGHLANPYTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQA
MAPSIDSISHSFANG-----VASAKQAVNGASTNIAVAGSHIPTTQVTQVDIVEKMLAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           LKMLA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           SPALSYLSPRTQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNVL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           PRWHDAFSFAAGTVVEVLSST---SLSLAAVNAWKVAAAESAISLTRQVRETFWSAASTS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           PRWHDAFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAISLTREVRNRFWQTPSSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 AAYTSELGHLANPVTTHVQPAEMANQAVNSLALISARRTTESNDVLSLLLATHLYCVLQA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 AAAVANTMEKTRIGIAQIGKINFTQITEMINAGMNRGIPSCIAAEDPSISYHCKGIDIAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ASAVSISMEKTRIALALIGKINFTQCTELLNAAMNRGLPSCLAAEDPSLNYHGKGLDIHI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 EGILRODRYPLRTSPOWLGPLVSDLIHAHAVLTIEAGQSTTDNPLIDVENKTSHHGGNFQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 EGILRQDRYPLRTSPQFLGPLVEDMMHAYSTLSLE-NNTTTDNPLLDVENKQTAHGGNFQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         SLTAMTVEAMVGHAGSFHPFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            VVHEGKEKILYAREAMALENLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         VLHEGTEKIMFAREAISLFGLEAVVLGPKEGLGLVNGTAVSASMATLSLHDSHMLSLLSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            SLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAISGHPDSKVH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    SLTRGHSAYRLVVLEALTNFLNHRITFIVPLRGSISASGDLSPLSYIAGAITGHPDVKVH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              716
                                                                                             72.4%; Score 2614; DB 27; 72.0%; Pred. No. 9.5e-247; tive 86; Mismatches 103;
                                                                                                Indels
                                                                                                                                                Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           ACID
                                                                                                                                                  716;
```

651

539

595 534

594

479

414 419 354 360 294 300

234

240 174 180

474

Ş В Ş DЬ 5 망 5

g 29

4 5 용성

дb Ş 멍 Ş 밁

ద Š 맑 5

14;

Gaps

ŭ, 60

5 4

```
RESULT 14
US-10-374-366-2
                                                                                                                                                       APPLICANT: Tang, Xiao-Song
APPLICANT: Milano, Joseph
APPLICANT: Milano, Joseph
TITLE OF INVENTION: NETHOD FOR THE RECOMBINATION OF
FILE REFERENCE: CL1794 US NA
CURRENT APPLICATION NUMBER: US/10/374,366
CURRENT FILING DATE: 2003-02-26
PRIOR APPLICATION NUMBER: 60/360,279
PRIOR APPLICATION NUMBER: 60/360,279
PRIOR FILING DATE: 2002-02-26
NUMBER OF SEQ ID NOS: 203
SOFTWARE: Patentin version 3.2
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Я
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Я
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             ž
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      밁
                                                                         ; SEQ ID NO 2; LENGTH: 716; TENGTH: PRT; TYPE: PRT; ORGANISM: Rhodosporidium glutinis JS-10-374-366-2
                                                                                                                                                                                                                                                                                                                                                                                                                                                              ¥
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             ž
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  ä
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Å
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ŋ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ŕ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    δÃ
          Query Match
Best Local Similarity
Matches 522; Conserv
                                                                                                                                                                                                                                                                                                                            Sequence 2, Application US/10374366 GENERAL INFORMATION:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 652
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 656
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                596
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  535
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 475
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    415
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     355
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     301
                                                                                                                                                                                                                                                                                                                                                                                                                                712
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      295
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       235
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     115
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        ភូភ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    61
                                                                                                                                                                                                                                                                                                                                                                                                                                LKMLA 716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                  VKMLA 720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               SPALSYLSPRIQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNVL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               APAHAYLSPRTRVLYSFVREELGVQARRGDVFVGVQQETIGSNVSRIYEAIKDGRINHVL 715
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       PRWHDAFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAISLTREVRNRFWQTPSSQ 655
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                IDLRATEFEFKKOFGPAIVSLIDOHFGSAMTGSNLRDELVEKVNKTLAKRLEOTNSYDLV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              VDLRAMELDEKKOFDPLLETLLOOHLG----TGLDV-NALALEVKKALNKRLEOTTTYDLE 595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               AAYTSELGHLANPUTTHVQPAEMANQAVNSLALISARRTTESNDVLSLLLATHLYCVLQA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  AAYASELGHLANPYTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQA 539
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                AAAVANTMEKTRIGLAQIGKINFTQITEMINAGMNRGIPSCLAAEDPSISYHCKGIDIAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ASAVSISMEKTRLALALIGKLNFTQCTELLNAAMNRGLPSCLAAEDPSLNYHGKGLDIHI 479
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 EGILRODRYPLRTSPOWLGPLVSDLIHAHAVLTIEAGOSTTDNPLIDVENXTSHHGGNFQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            EGILRQDRYPLRTSPQFLGPLVEDMMHAYSTLSLE-NNTTTDNPLLDVENXQTAHGGNFQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  SLTAMTVEAMVGHAGSFHPFLHDVTRPHFTQIEVAGNIRKLLEGSRFAVHHEEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      ALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              VLHEGTEKIMFAREAISLFGLEAVVLGPKEGLGLVNGTAVSASMATLSLHDSHMLSLLSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   GFGGSADTRTEDAVSLQKALIEHQLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIRVN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                PRWHDAFSFAAGTVVEVLSST---SLSLAAVNAWKVAAAESAISLTRQVRETFWSAASTS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    GFGGSADTRTEDAISLOKALLEHOLCGVLPSSFDSFRLGRGLENSLPLEVVRGAMTIRVN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   VVHEGKEKILYAREAMALENLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLSQ
        72.4%; Score 2614; DB 29; ilarity 72.0%; Pred. No. 9.5e-247; Conservative 86; Mismatches 103;
                                                                                                                                                                                                                                                                              OF GENETIC
            Indels
                                        Length
                                          716;
                                                                                                                                                                                                                                                                              ELEMENTS
          14;
          Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                651
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 534
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   414
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   419
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    354
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   180
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     294
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      234
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     174
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      114
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    120
          5
APPLICANT: Sariaslani, Sima
APPLICANT: Tang, Xao-Song
APPLICANT: Vanelli, Todd
TITLE OF INVENTION: Microbial Conversion of
FILE REFERENCE: CL1912
CURRENT APPLICATION NUMBER: US/10/439,478
CURRENT FILING DATE: 2003-05-16
PRIOR APPLICATION NUMBER: 60/383450
PRIOR APPLICATION NUMBER: 60/383450
PRIOR FILING DATE: 2002-05-23
NUMBER OF SEQ ID NOS: 18
SOFTWARE: Microsoft Office 97
SEQ ID NO 2
                                                                                                                                                                                                                                                                                            RESULT 15
US-10-439-478-2
                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                      Ş
                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ₽
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ş
                                                                                                                                                                                                                        Sequence 2, Application US/10439478
GENERAL INFORMATION:
APPLICANT: E.I. du Pont de Nemours
APPLICANT: Ben-Bassat, Arie
                                                                                                                                                                                                           APPLICANT:
                                                                                                                                                                                                                                                                                                                                                                                                                              652
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               535
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                475
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   175
                                                                                                                                                                                                                                                                                                                                                                                             716 VKMLA 720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                656
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               596
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               415
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                355
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   295
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  235
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    115
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    55
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    щ
                                                                                                                                                                                                                                                                                                                                                             LKMLA
                                                                                                                                                                                                                                                                                                                                                                                                                                                       APAHAYLSPRTRVLYSFVREELGVQARRGDVFVGVQQETIGSNVSRIYEAIKDGRINHVL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 AAYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               ALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEVKVKDD 360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  VLHEGTEKIMFAREAISLFGLEAVVLGPKEGLGLVNGTAVSASMATLSLHDSHMLSLLSQ 300
                                                                                                                                                                                                                                                                                                                                                                                                                              SPALSYLSPRIQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNVL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             IDLRAIEFEFKKQFGPAIVSLIDQHFGSAMTGSNLRDELVEKVNKTLAKRLEQINSYDLV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             VDLRAMELDEKKOFDELLETILOOHLG---TGLDV-NALALEVKKALNKRLEOTTTYDLE 595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 SLTAMTVEAMVGHAGSFHPFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       SLTRGHSAVRLVVLEALTNFLNHRITFIVPLRGSISASGDLSPLSYIAGAITGHPDVKVH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              PRWHDAFSFAAGTVVEVLSST---SLSLAAVNAWKVAAAESAISLTRQVRETFWSAASTS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        PRWHDAFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAISLTREVRNRFWQTPSSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              AAYTSELGHLANPVTTHVQPAEMANQAVNSLALISARRTTESNDVLSLLLATHLYCVLQA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               AAAVANTMEKTRIGIAQIGKINFTQITEMINAGMNRGIPSCLAAEDPSISYHCKGIDIAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  ASAVSISMEKTRLALALIGKLNFTQCTELLNAAMNRGLFSCLAAEDPSLNYHGKGLDIHI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              EGILRQDRYPLRTSPQWLGPLVSDLIHAHAVLTIEAGQSTTDNPLIDVENKTSHHGGNFQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              EGILRODRYPLRTSPOFLGPLVEDMMHAYSTLSLE-NNTTTDNPLLDVENKQTAHGGNFQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  VVHEGKEKILYAREAMALFNLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   SLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAISGHPDSKVH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    GFGGSADTRTEDAISLQKALLEHQLCGVLPSSFDSFRLGRGLENSLPLEVVRGAMTIRVN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GFGGSADTRTEDAVSLQKALIEHQLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIRVN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  PTDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDXSVEFLRSQLSMSVYGVTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 PTDDVVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSVYGVTT 120
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   MAPSIDSISHSFANG-----VASAKQAVNGASTNIAVAGSHIPTTQVTQVDIVEKMLAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   MAPSIDSLATTLANGFTNGSHAAPTKSAAGPTSALRRTPGLDGHAAHQSQLEIVQELLSD
                                                                                                                                                                                                           Ben-Bassat,
Qi, Wei Wei
                                                                                                                                                                                                                                                                                                                                                               716
                                                                                                                                                                                                                         de Nemours
Arie
                                                                                                                                                                                                                                             and
                                                                                                                                                                                                                                             င္ပ
                                                                                                                                          ō
H
                                                                                                                                          Glucose
                                                                                                                                            ő
                                                                                                                                         Para-Hydroxystyrene
```

715

651 655

711

594

539

534

479

414 419 354

294

474

240

174

180 114

```
Search completed: September 9,
Job time: 298.768 secs
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  ; LENGTH: 716
TYPE: PRT
; ORGANISM: Rhodotorula glutinis
US-10-439-478-2
                                                                                                                P,
                                                                                                                                         Ş
                                                                                                                                                                          В
                                                                                                                                                                                                                                 Вb
                                                                                                                                                                                                                                                             Š
                                                                                                                                                                                                                                                                                            맑
                                                                                                                                                                                                                                                                                                                     5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                      В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 B
                                                                                                                                                                                                  5
                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                á
                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                                       Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Query Match
Best Local Similarity
Matches 522; Conserv
                                                                                      716
                                                                                                                  652
                                                                                                                                              900
                                                                                                                                                                           595
                                                                                                                                                                                                       965
                                                                                                                                                                                                                                   535
                                                                                                                                                                                                                                                               540
                                                                                                                                                                                                                                                                                            475
                                                                                                                                                                                                                                                                                                                                                    415
                                                                                                                                                                                                                                                                                                                                                                                                               355
                                                                                                                                                                                                                                                                                                                                                                                                                                         361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                     295
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                235
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         175
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  115
                                                         712
                                                                                                                                                                                                                                                                                                                        480
                                                                                                                                                                                                                                                                                                                                                                                 420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          181 SLTRGHSAVRLVVLEALTNFLNHRITPIVPLRGSISASGDLSPLSYIAGAITGHPDVKVH 240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                121 GFGGSADTRTEDAVSLQKALIEHQLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIRVN 180
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       55 PTDSTLELDGYSLNLGDVYSAARKGRPVRVXDSDEIRSKIDKSVEFLRSQLSMSVYGVTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1 MAPSLDSISHSFANG-----VASAKQAVNGASTNLAVAGSHLPTTQVTQVDIVEKMLAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1 MAPSIDSIATTLANGFTNGSHAAPTKSAAGPTSALRRTPGLDGHAAHQSQLEIVQELLSD 60
                                                                                                                                                                                                                                                                                                                                                 ASAVSISMEKTRLALALIGKLNFTQCTELLNAAMNRGLPSCLAAEDPSLNYHGKGLDIHI 479
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              LKMLA 716
                                                                                   VKMLA 720
                                                                                                                SPALSYLSPRTQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNVL
                                                                                                                                APAHAYLŚPRTRVLYSFVREELGVQARRGDVFVGVQQETIGSNVSRIYEAIKDGRINHVL 715
                                                                                                                                                                        PRWHDAFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAISLTREVRNRFWQTPSSQ 655
                                                                                                                                                                                                                                 | IDERAIEFEFKKQFGPAIVSLIDQHFGSAMTGSNERDELVEKVNKTLAKRLEQTNSVDLV 594
                                                                                                                                                                                                                                                    VDLRAMELDFKKQFDPLLPTLLQQHLG---TGLDV-NALALEVKKALNKRLEQTTTYDLE 595
                                                                                                                                                                                                                                                                                            AAYTSELGHLANPVTTHVQPAEMANQAVNSLALISARRTTESNDVLSLLLATHLYCVLQA
                                                                                                                                                                                                                                                                                                            AAYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQA 539
                                                                                                                                                                                                                                                                                                                                                                                                                             EGILRQDRYPLRTSPQFLGPLVEDMMHAYSTLSLE-NNTTTDNPLLDVENKQTAHGGNFQ 419
                                                                                                                                                                                                                                                                                                                                                                                                                                                                     SLTAMTVEAMVGHAGSFHPFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      ALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEVKVKJD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         SLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAISGHPDSKVH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               GFGGSADTRTEDAISLQKALLEHQLCGVLPSSFDSFRLGRGLENSLPLEVVRGAMTIRVN 174
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              PTDDVVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSVYGVTT
                                                                                                                                                                                                                                                                                                                                                                                                               EGILRODRYPLRTSPOWLGPLVSDLIHAHAVLTIEAGQSTTDNPLIDVENKTSHHGGNFQ 414
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         72.4%; Score 2614; DB 30; 72.0%; Pred. No. 9.5e-247; ative 86; Mismatches 103;
               2004, 10:19:37
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Length 716;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            14;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Gaps
                                                                                                                                                                                                                                                                                            534
                                                                                                                                                                                                                                                                                                                                                                                                                                                                        354
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         234
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          114
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       120
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   5
4
```

```
Title:
Perfect score:
Sequence:
                                                                                                                                                                                                                                                      Result
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Run
                                                                                                                                                                                                                                                                                                                                                                                                                                                         Minimum DB seq length: 0
                                                                                                                                                                                                                                                                                                                                                                                                      Database
                                                                                                                                                                                                                                                                                                                                                                                                                     Post-processing: Minimum Match 0%
Maximum Match 100%
Listing first 45 summaries
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    rotal number of hits satisfying chosen parameters:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Searched:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Scoring table:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           OM protein
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         9
    Pred. No. is the number of results predicted by chance to have a score greater than or equal to the score of the result being printed, and is derived by analysis of the total score distribution.
   Score
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            ı
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          protein search, using sw model
                                                                                                                                                                                                                                                     Query
Match
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       BLOSUM62
Gapop 10.0 , Gapext 0.5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             3610
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      September 9, 2004, 10:04:49; Search time 43.8174 Seconds (without alignments)
2131.280 Million cell updates/sec
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       704768 seqs, 129704438 residues
                                                                                                                                                                                                                                                                                                                                 Pending_Patents_AA_New:*

// cgn2_6/ptcdata/2/paa/USO6_NEW_COMB.pep:*

// cgn2_6/ptcdata/2/paa/USO6_NEW_COMB.pep:*

// cgn2_6/ptcdata/2/paa/USO8_NEW_COMB.pep:*

// cgn2_6/ptcdata/2/paa/USO8_NEW_COMB.pep:*

// cgn2_6/ptcdata/2/paa/USO8_NEW_COMB.pep:*

// cgn2_6/ptcdata/2/paa/USO8_NEW_COMB.pep:*

// cgn2_6/ptcdata/2/paa/USO8_NEW_COMB.pep:*
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     US-09-939-408A-13
   MAPSIDSLATTLANGFINGS......RIYEAIKDGRINHVLVKMLA 720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    GenCore version 5.1.6
Copyright (c) 1993 - 2004 Compugen Ltd.
                                                                                                                                                                                                                                                     Length
   DB
US-10-476-193-4
US-10-476-193-19
US-10-476-193-19
US-10-476-193-24
US-10-476-193-24
US-10-476-193-22
US-10-476-193-22
US-10-476-193-20
US-10-476-193-20
US-10-476-198-21
US-10-476-198-21
US-10-476-198-21
US-10-476-198-17
US-10-476-198-17
US-10-476-198-17
US-10-476-198-17
US-10-476-198-17
US-10-476-198-17
US-10-476-198-17
US-10-491-823-334
US-10-425-115-267547
US-10-425-115-267547
US-10-425-115-218419
US-10-425-115-218419
US-10-425-115-218419
                                                                                                                                                                                                                                                     IJ
                                                                                                                                                                                                                                                                                SUMMARIES
                                                                                                                                                                                                                                                     Description
                                              sequence
Sequence
Sequence
                                                                                                                     Sequence
Sequence
Sequence
Sequence
            Sequence
Sequence
                                                                                   Sequence
Sequence
Sequence
                                                                                                                                                                                    Sequence
Sequence
                                                                                                                                                                   Sequence
Sequence
   Sequence
                             Sequence
                                       Sequence
                                                                                                                                                                                                      Sequence
                                                                                                                                                                                                                Sequence
                                                                                                                                                                                                                                  Sequence
                                                                                                                                                           Sequence
                                                                                                                                                                                                                          Sequence
 17, Appl
334, App
334, App
10, Appl
267547,
28, Appl
218451,
218459,
47379, A
                                                                                           4, Appli
19, Appli
19, Appli
24, Appli
24, Appli
22, Appli
22, Appli
21, Appli
```

S

361 EGILRQDRYPLRTSPQFLGPLVEDMMHAYSTLSLE-NNTTTDNPLLDVENKQTAHGGNFQ 419

D	Query Best Match	RESULT US-10-4 US-10-6 US-10-6 US-10-6 US-10-6 US-10-6 US-10-6 US-10-6 US-10-6 US-10-6 US-10-6 US-10-6		22266666666666666666666666666666666666
DVVELSGYSLITVRDVVGAARKGRRVRVQNDBEIRARVDKSVDFLKAQLQNSVYGVTT	ry Match  t Local Similarity 72.0%; Pred. ches 522; Conservative 86; Mi  1 MAPSLDSLATTLANGFINGSHAAPT	17 1 1476-193-4 Lence 4, Application US/10476193 ERAL INFORMATION: PLICANT: Sariasiani, Sima PLICANT: Tang, xiao-Song PLICANT: Qi, Wei Wei TLE OF INVENTION: Methods for the Production of Tyrosine, Cinnamic Acid and Para TLE OF INVENTION: hydroxycinnamic Acid TLE OF INVENTION: hydroxycinnamic Acid TLE PETERENCE: CL1777 TL NO 4 THE PROSE TO NOWEER: US/10/476,193 RRENT FILING DATE: 2003-10-28 THE PROSE TO SEQ ID NOS: 24 THE PROSE MICROSOFT Office 97 TD NO 4 REGITH: 716 TPSE PRT TCANISM: C. violaceum 476-193-4	ALIGNMENTS	7 985.5 27.3 713 7 US-60-563-879-184 Sequence 184, App 895 27.3 717 6 US-10-425-115-21755 Sequence 21755, 9 983.5 27.2 704 6 US-10-425-115-218411 Sequence 218411, 983 27.2 714 6 US-10-69-350-13 Sequence 108, App 983.5 27.2 711 7 US-60-563-879-108 Sequence 108, App 1 982 27.2 711 7 US-60-563-879-109 Sequence 109, App 2 70.1 706 6 US-10-425-115-21755 Sequence 23953, 27.2 713 7 US-60-563-879-109 Sequence 33953, 27.2 713 7 US-60-563-879-109 Sequence 33953, 27.2 713 7 US-60-563-879-109 Sequence 33963, 27.2 72 6 US-10-425-115-21755 Sequence 237553, 27.3 72.6 8 US-10-425-115-339642 Sequence 33942, 27.3 72.6 8 US-10-425-115-339642 Sequence 33942, 27.3 8 US-10-425-115-21755 Sequence 237033, 27.3 8 US-10-425-115-21755 Sequence 237033, 27.3 8 US-10-425-115-21755 Sequence 277544, 27.3 8 US-10-425-115-267544 Sequence 267544, 27.3 8 US-10-425-115-267544 Sequence 267544, 27.3 15.0 15.0 7 US-60-579-902-6176 Sequence 267539, 27.3 15.0 15.0 15.0 15.0 15.0 15.0 15.0 15.0
		ı		,

```
Ş
5
                                 망
                                                              Ş
                                                                                                   밁
                                                                                                                                                                     В
                                                                                                                                                                                                Ş
                                                                                                                                                                                                                               B
                                                                                                                                                                                                                                                                  S
                                                                                                                                                                                                                                                                                                          뫄
                                                                                                                                                                                                                                                                                                                                   5
                                                                                                                                                                                                                                                                                                                                                                                                                                          ; LENGTH: 716
; TYPE: PRT
; ORGANISM: C. violaceum
US-10-476-198-4
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 유
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              g
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         ф
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     APPLICANT: Sariasiani, Sima
APPLICANT: Tang, Xiao-Song
APPLICANT: Tang, Xiao-Song
APPLICANT: Qi, Wei Wei
TITLE OF INVENTION: Methods for the Production of Tyrosine, Cinnamic Acid and Para-
TITLE OF INVENTION: hydroxycinnamic Acid
FILE REPERBNCE: CL1777
CURRENT APPLICATION: NUMBER: US/10/476,198
CURRENT FILING DATE: 2003-10-24
NUMBER OF SEQ ID NOS: 24
SOFTWARE: Microsoft Office 97
SEQ ID NO 4
TENEMOT: 716
                                                                                                                                                                                                                                                                                                                                                                                            Query Match
Best Local 9
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Sequence 4, Application US/10476198 GENERAL INFORMATION:
                                                                                                                                                                                                                                                                                                                                                                          Local Similarity
hes 522; Conserv
                                                                                                       175
                                                                                                                                       181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      712
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        652
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          596
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         535
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            475
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               355
       301
                                                                                                                                                                                                       121
                                                                                                                                                                                                                                        ហ
                                                                                                                                                                                                                                                                        61
                                                                                                                                                                                                                                                                                                          1 MAPSIDSISHSFANG-----VASAKQAVNGASTNLAVAGSHLPTTQVTQVDIVEKMLAA
                                                                                                                                                                                                                                                                                                                                          1 MAPSLDSLATTLANGFTNGSHAAPTKSAAGPTSALRRTPGLDGHAAHQSQLEIVQELLSD
                                                                                                                                                                                           GFGGSADTRTEDAVSLQKALIEHQLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIRVN
                                                                   VLHEGTEKIMFAREAISLFGLEAVVLGPKEGLGLVNGTAVSASMATLSLHDSHMLSLLSQ
                                                                                                     SLTRGHSAVRLVVLEALINFLNHGITPIVPLRGTISASGDLSPLSYIAAAISGHPDSKVH
                                                                                                                                       SLTRGHSAVRLVVLEALTNFLNHRITPIVPLRGSISASGDLSPLSYIAGAITGHPDVKVH
                                                                                                                                                                         GFGGSADTRTEDAISLQKALLEHQLCGVLPSSFDSFRLGRGLENSLPLEVVRGAMTIRVN
                                                                                                                                                                                                                                         PTDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVTT
                                                                                                                                                                                                                                                               PTDDVVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSVYGVTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      VKMLA 720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 APAHAYLSPRTRVLYSFVREELGVQARRGDVFVGVQQETIGSNVSRIYEAIKDGRINHVL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          PRWHDAFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAISLTREVRNRFWQTPSSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         IDLRAIEFEFKKQFGPAIVSLIDQHFGSAMTGSNLRDELVEKVNKTLAKRLEQTNSYDLV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       VDLRAMELDEKKOFDELLETLIQOHLG----TGLDV-NALALEVKKALNKRLEOTTTYDLE 595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         AAYTSELGHLANPYTTHVQPAEYANQAVNSLALISARRTTESNDVLSLLLATHLYCVLQA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    AAYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQA 539
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             ASAVSISMEKTRLALALIGKLNFTQCTELLNAAMNRGLPSCLAAEDPSLNYHGKGLDIHI 479
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           EGILAQDRYPLATSPQMLGPLVSDLIHAHAVLTIEAGQSTTDNPLIDVENKTSHHGGNFQ
     ALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEVKVKDD
                                   VVHEGKEKILYAREAMALFNLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      SPALSYLSPRTQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNVL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        PRWHDAFSFAAGTVVEVLSST---SLSLAAVNAWKVAAAESAISLTRQVRETFWSAASTS 651
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             AAAVANTMEKTRIGIAQIGKINFTQITEMINAGMNRGIPSCLAAEDPSISYHCKGIDIAA 474
                                                                                                                                                                                                                                                                                                                                                                            Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      716
                                                                                                                                                                                                                                                                                                                                                                        72.4%; Score 2614; DB 6; 72.0%; Pred. No. 3.2e-194; ative 86; Mismatches 103;
                                                                                                                                                                                                                                                                                                                                                                                                          Length 716;
                                                                                                                                                                                                                                                                                                                                                                            Indels
                                                                       300
                                                                                                       234
                                                                                                                                       240
                                                                                                                                                                                                       180
                                                                                                                                                                                                                                         114
                                                                                                                                                                                                                                                                         120
                                                                                                                                                                                                                                                                                                          54
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          9
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         594
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               414
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            534
                                                                                                                                                                                                                                                                                                                                                                                            APPLICANT: Qi, Mei Wei
TITLE OF INVENTION: Methods for the Production of Tyrosine, Cinnamic Acid and
TITLE OF INVENTION: hydroxycinnamic Acid
FILE REFERENCE: CL1777
CURRENT APPLICATION NUMBER: US/10/476,193
CURRENT FILING DATE: 2003-10-28
NUMBER OF SEQ ID NOS: 24
SOUTWAREN Microsoft Office 97
SEQ ID NO 19
LENGTH: 716
TYPE: PRT
OPGRANTO:
                                     밁
                                                                   Ś
                                                                                                                                                                     ; NAME/KEY: MISC FEATURE , LOCATION: (540)..(540) , CTHER INFORMATION: X-Thr, Ala, US-10-476-193-19
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                RESULT 3
US-10-476-193-19
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Š
     Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             벍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ś
                                                                                                       Query Match
Best Local S
Matches 522
                                                                                                                                                                                                                                                                                                                        ORGANISM: Rhodotorula glutinis
FEATURE:
NAME/KEY: MISC FEATURE
LOCATION: (198)..(198)
OTHER INFORMATION: X=Asp, Asn,
                                                                                                                                                                                                                                                         NAME/KEY: MISC_FEATURE
LOCATION: (198)...(198)
OTHER INFORMATION: Xaa=Asp, Asn, Glu,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      596
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        535
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         475
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    652 SPALSYLSPRTQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNVL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          656 APAHAYLSPRTRVLYSFVREELGVQARRGDVFVGVQQETIGSNVSRIYEAIKDGRINHVL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            415
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               295
                                                                                                     tch 72.4%; al Similarity 72.0%; 522; Conservative 8
       61
                                                            1 MAPSIDSIATTIANGFTNGSHAAPTKSAAGPTSAIRRTPGIDGHAAHQSQIEIVQEIISD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             EGILRODRYPLRTSPOFLGPLVEDMYHAYSTLSLE-NNTTTDNPLLDVENKQTAHGGNFQ 419
                                         MAPSIDSISHSFANG-----VASAKQAVNGASTNLAVAGSHIPTTQVTQVDIVEKMLAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    VKMLA 720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     VDLRAMELDEKKQEDELLETLLQQHLG---TGLDV-NALALEVKKALNKRLEQTTTYDLE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              AAYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ASAVSISMEKTRLALALIGKLNFTQCTELLNAAMNRGLPSCLAAEDPSLNYHGKGLDIHI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             PTDDVVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSVYGVTT 120
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        PRWHDAFSFAAGTVVEVLSST---SLSLAAVNAWKVAAAESAISLTRQVRETFWSAASTS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      PRWHDAFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAISLTREVRNRFWQTPSSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        IDLRATEFERKKOFGPAIVSLIDQHFGSAMTGSNLRDELVEKVNKTLAKRLEQTNSYDLV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          AAYTSELGHLANPVTTHVQPAEMANQAVNSLALISARRTTESNDVLSLLLATHLYCVLQA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            AAAVANTMEKTRIGIAQIGKINFTQITEMINAGMNRGIPSCIAAEDPSISYHCKGIDIAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      716
                                                                                                         85;
                                                                                                     Score 2613; DB 6;
Pred. No. 3.8e-194;
5; Mismatches 104;
                                                                                                                                                                                         Ser,
                                                                                                                                                                                           Pro,
                                                                                                                                                                                                                                                             Gla
                                                                                                                                                                                           Gly
                                                                                                                                         Length 716;
                                                                                                         Indels
                                                                                                         14;
                                                                                                         Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              474
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              479
                                                                          60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          655
                                         54
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          651
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          594
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            534
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          539
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        711
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                354
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   and
                                                                                                           ۍ
--
```

```
APPLICANT: Sariasiani, Sima
APPLICANT: Tang, Xiao-Song
APPLICANT: Q1, Wei Wei
TITLE OF INVENTION: Methods for the Production of Tyr
TITLE OF INVENTION: hydroxycinnamic Acid
FILE REFERENCE: CL1777
CURRENT APPLICATION NUMBER: US/10/476,198
CURRENT FILLING DATE: 2003-10-24
NUMBER OF SEQ ID NOS: 24
SOFTWARE: Microsoft Office 97
SEQ ID NO 19
LENGTH: 716
TYPE: PRT
ORGANISM: Rhodotorula glutinis
FEATURE:
NAME/KEY: MISC FEATURE
LOCATION: (198)...(198)
FEATURE:
NAME/KEY: MISC FEATURE
LOCATION: (198)...(198)
FEATURE:
                                                                                                                                                                                                                                                                                                                                                                                                                                                               RESULT 4
US-10-476-198-19
                                                                                                                                                                                                                                                                                                                                                                                                                           Sequence 19, Application US/10476198 GENERAL INFORMATION:
    NAME/KEY: MISC_FEATURE LOCATION: (198)..(198)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 652
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         656
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              535
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          475
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        415
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      355
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    295
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  235
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                175
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     712 LKMLA 716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ü
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               SPALSYLSPRTQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNVL 711
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           ALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 GFGGSADTRTEDAVSLQKALIEHQLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIRVN 180
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       VKMLA 720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     APAHAYLSPRTRVLYSFVREELGVQARRGDVFVGVQQETIGSNVSRIYEAIKDGRINHVL 715
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     PRWHDAFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAISLTREVRNRFWQTPSSQ 655
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 AAYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           ASAVSISMEKTRLALIALIGKLNFTQCTELLNAAMNRGLPSCLAAEDPSLNYHGKGLDIHI 479
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   EGILRODRYPLRTSPOFLGPLVEDMMHAYSTLSLE-NNTTTDNPLLDVENKQTAHGGNFQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                VVHEGKEKILYAREAMALFNLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLSQ 294
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             VLHEGTEKIMFAREAISLFGLEAVVLGPKEGLGLVNGTAVSASMATLSLHDSHMLSLLSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            SITRGHSAVRLVVLEALTNFLNHXITPIVPLRGTISASGDLSPLSYIAAAISGHPDSKVH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             SLTRGHSAVRLVVLEALTNELNHRITPIVPLRGSISASGDLSPLSYIAGAITGHPDVKVH 240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        GFGGSADTRTEDAISLQKALLEHQLCGVLPSSFDSFKLGRGLENSLFLEVVRGAMTIRVN 174
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             PRWHDAFSFAAGTVVEVLSST---SLSLAAVNAWKVAAAESAISLTRQVRETFWSAASTS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           IDLRAXEFEFKKQFGPAIVSLIDQHFGSAMTGSNLRDELVEKVNKTLAKRLEQTNSYDLV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 VDLRAMELDEKKQFDPLLPTLLQQHLG---TGLDV-NALALEVKKALNKRLEQTTTYDLE 595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       AAYTSELGHLANPVTTHVQPAEMANQAVNSLALISARRTTESNDVLSLLLATHLYCVLQA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      AAAVANTMEKTRIGIAQIGKINFTQITEMINAGMNRGIPSCLAAEDPSISYHCKGIDIAA 474
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    EGILRODRYPLRTSPOWLGPLVSDLIHAHAVLTIEAGQSTTDNPLIDVENKTSHHGGNFQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    SLTAMTVEAMVGHAGSFHPFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Tyrosine, Cinnamic
                                                                                                                                                                                                                                                                                                                                               Acid and
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            234
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          534
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                539
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               651
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    414
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            419
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    354
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      300
                                                                                                                                                                                                                                                                                                                                                 Para-
RESULT 5
US-10-476-193-24
US-10-476-193-24
; Sequence 24, Application US/10476193
; GENERAL INFORMATION:
; APPLICANT: Sariasiani, Sima
; APPLICANT: Tang, Xiao-Song
; APPLICANT: Of Wei Wei
; TITLE OF INVENTION: Methods for the Production of Tyrosine, Cinnamic Acid and Para-
; TITLE OF INVENTION: hydroxycinnamic Acid
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        ; OTHER INFORMATION: Xaa=Asp, Asn, Glu, FEATURE; ANAME/KEY: MISC FEATURE; LOCATION: (540)...(540) OTHER INFORMATION: X=Thr, Ala, Ser, P: US-10-476-198-19
                                                                                                                                                                                                                                                           Ş
                                                                                                                                                                                                                                                                                                       B,
                                                                                                                                                                                                                                                                                                                                           Š
                                                                                                                                                                                                                                                                                                                                                                                   B
                                                                                                                                                                                                                                                                                                                                                                                                                     Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              맑
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Query Match 72.4%;
Best Local Similarity 72.0%;
Matches 522; Conservative 8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 415
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        175
                                                                                                                                                                                                                           712
                                                                                                                                                                                                                                                                                                         652
                                                                                                                                                                                                                                                                                                                                                                                                                   596 PRWHDAFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAISLTREVRNRFWQTPSSQ 655
                                                                                                                                                                                                                                                                                                                                                                                                                                                                   535
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   475
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               355
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              295
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       301 ALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          235
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      115
                                                                                                                                                                                                                                                             716 VKMLA 720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           181 SLTRGHSAVRLVVLEALTNFLNHRITPIVPLRGSISASGDLSPLSYIAGAITGHPDVKVH 240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     121 GFGGSADTRTEDAVSLQKALIEHQLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIRVN 180
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    ម
ម
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Н
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1 MAPSIDSLATTLANGFTNGSHAAPTKSAAGPTSALRRTPGIDGHAAHQSQLEIVQELLSD
                                                                                                                                                                                                                                                                                                       SPALSYLSPRIQITYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNVL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       VDLRAMELDEKKQEDELLETILLQQHLG---TGLDV-NALALEVKKALNKRLEQTTTYDLE 595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     ASAVSISMEKTRLALIGKLNFTQCTELLNAAMNRGLPSCLAAEDPSLNYHGKGLDIHI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         EGILRQDRYPLRTSPQFLGPLVEDMMHAYSTLSLE-NNTTTDNPLLDVENKQTAHGGNFQ 419
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           SLTAMTVEAMVGHAGSFHPFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    GFGGSADTRTEDAISLQKALLEHQLCGVLPSSFDSFRLGRGLENSLPLEVVRGAMTIRVN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           PTDDVVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSVYGVTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                MAPSIDSISHSFANG-----VASAKQAVNGASTNLAVAGSHLPTTQVTQVDIVEKMLAA 54
                                                                                                                                                                                                                           LKMLA 716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          VVHEGKEKILYAREAMALFNLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 SLTRGHSAVRLVVLEALTNFLNHXITFIVPLRGTISASGDLSPLSYIAAAISGHEDSKVH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   AAYTSELGHLANPVTTHVQPAEMANQAVNSLALISARRTTESNDVLSLLLATHLYCVLQA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             AAYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQA 539
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 AAAVANTMEKTRIGIAQIGKINFTQLTEMINAGMNRGIPSCLAAEDPSISYHCKGIDIAA 474
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    PTDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVTT
                                                                                                                                                                                                                                                                                                                                             APAHAYLSPRTRVLYSFVREELGVQARRGDVFVGVQQETIGSNVSRIYEAIKDGRINHVL 715
                                                                                                                                                                                                                                                                                                                                                                                                                                                                     IDLRAXEFEFKKQFGPAIVSLIDQHFGSAMTGSNLRDELVEKVNKTLAKRLEQTNSYDLV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             EGILRQDRYPLRTSPQWLGPLVSDLIHAHAVLTIEAGQSTTDNPLIDVENKTSHHGGNFQ
                                                                                                                                                                                                                                                                                                                                                                                     PRWHDAFSFAAGTVVEVLSST---SLSLAAVNAWKVAAAESAISLTROVRETFWSAASTS:651
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            85;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Score 2613; DB 6;
Pred. No. 3.8e-194;
5; Mismatches 104;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Pro,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Gln
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               G1y
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Length 716;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Indels 14;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   534
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          294
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        174
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        120
                                                                                                                                                                                                                                                                                                                                                                                                                                                                       594
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         479
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    114
                                                                                                                                                                                                                                                                                                           711
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               414
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        234
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              354
```

맑 8 В Ş

Ş

8 뮍 Ş B, Š В 밁

Š Ŗ S 멍 δ

Ş

В 8

D,

```
RESULT 6
US-10-476-198-24
Genuence 24, Application
                                                                           Ś
                                                                                            Ş
                                                                                                                                                                                                                   유
                                                                                                                                                                                                                                                          B
                                                                                                                                                                                                                                                                              Ş
                                                                                                                                                                                                                                                                                                                      Ş
                                                                                                                                                                                                                                                                                                                                                           Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                           5
                                                                                                                                                                                                                                                                                                DЪ
                                                                                                                                                                                                                                                                                                                                            당
                                                                                                                                                                                                                                                                                                                                                                               Вb
                                                                                                                                                                                                                                                                                                                                                                                                     Ş
                                                                                                                                                                                                                                                                                                                                                                                                                           В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Дb
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ; FEATURE: ; OTHER INFORMATION: mutant from US-10-476-193-24
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     FILE REFERENCE: CL1777
CURRENT APPLICATION NUMBER: US/10/476,193
CURRENT FILING DATE: 2003-10-28
NUMBER OF SEQ ID NOS: 24
SOFTWARE: Microsoft Office 97
SEQ ID NO 24
LENGTH: 716
TYPE: PRT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Best Local Similarity Matches 522; Conserv
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Query Match
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              ORGANISM: artificial
                                                             712
                                                                                 716
                                                                                                     652
                                                                                                                       656
                                                                                                                                           595
                                                                                                                                                               596
                                                                                                                                                                                  535
                                                                                                                                                                                                      540
                                                                                                                                                                                                                          475
                                                                                                                                                                                                                                             480
                                                                                                                                                                                                                                                                 415
                                                                                                                                                                                                                                                                                    420
                                                                                                                                                                                                                                                                                                        355
                                                                                                                                                                                                                                                                                                                           361
                                                                                                                                                                                                                                                                                                                                              295
                                                                                                                                                                                                                                                                                                                                                                 301
                                                                                                                                                                                                                                                                                                                                                                                      235
                                                                                                                                                                                                                                                                                                                                                                                                         241
                                                                                                                                                                                                                                                                                                                                                                                                                             175
                                                                                                                                                                                                                                                                                                                                                                                                                                               181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                   115
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           ប្រ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             61
                                                                                                                                                                                                                                                                                                                                                                                     MAPSIDSLATTLANGFTNGSHAAPTKSAAGPTSALRRTPGLDGHAAHQSQLEIVQELLSD
                                                              LKMLA
                                                                                 VKMLA
                                                                                                     SPALSYLSPRIQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNVL
                                                                                                                APAHAYLSPRTRVLYSFVREELGVQARRGDVFVGVQQETIGSNVSRIYEAIKDGRINHVL
                                                                                                                                          PRWHDAFSFAAGTVVEVLSST---SLSLAAVNAWKVAAAESAISLTRQVRETFWSAASTS
                                                                                                                                                      PRWHDAFSYATGTVVELLSSSPSANVTLTAVNAMKVASAEKAISLTREVRNFWQTPSSQ
                                                                                                                                                                                VDLRAMELDFKKQFDFLLFTLLQQHLG----TGLDV-NALALEVKKALNKRLEQTTTYDLE
                                                                                                                                                                                                                        AAYTSELGHLANDVTTHVQPAEMANQAVNSLALISARRTTESNDVLSLLLATHLYCVLQA
                                                                                                                                                                                                                                        AAYASELGHLANPVTTFVQPAEMCNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQA
                                                                                                                                                                                                                                                               ASAVSISMEKTRIALALIGKLNFTQCTELLNAAMNRGLPSCLAAEDPSLNYHGKGLDIHI
                                                                                                                                                                                                                                                                                                      EGILRQDRYPLRTSPQMLGPLVSDLIHAHAVLTIBAGQSTTDNPLIDVENKTSHHGGNFQ
                                                                                                                                                                                                                                                                                                                     EGILRQDRYPLRTSPQFLGPLVEDMMHAYSTLSLE-UNTTTDUPLLDVEUKQTAHGGNFQ
                                                                                                                                                                                                                                                                                                                                              SLTAMTVEAMVGHAGSFHPFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                           ALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                                                                                            SLTRGHSAVRLYVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAISGHPDSKVH
                                                                                                                                                                                                                                                                                                                                                                                                                                         SLTRGHSAVRLVVLEALTNFLNHRITFIVPLRGSISASGDLSPLSYIAGAITGHPDVKVH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GFGGSADTRTEDAVSLQKALIEHQLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIRVN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           PTDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           PTDDVVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSVYGVTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 MAPSIDSISHSFANG-----VASAKQAVNGASTNLAVAGSHLPTTQVTQVDIVEKMLAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                   GFGGSADTRTEDAISLQKALLEHQLCGVLPSSFDSFRLGRGLENSLPLEVVRGAMTIRVN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Conservative
                                                              716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  72.4%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          85;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Score 2612; DI
Pred. No. 4.6e
85; Mismatches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            rhodotorula
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              DB 6;
4.6e-194;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          glutinis
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          14;
                                                                                                                                                                                                                                                                                                                           419
                                                                                                                                                                                                                                                                                                                                                                 360
                                                                                                                                                                                                                                                                                                                                                                                     294
                                                                                                                                                               655
                                                                                                                                                                                                                                             539
                                                                                                                                                                                                                                                                 474
                                                                                                                                                                                                                                                                                      479
                                                                                                                                                                                                                                                                                                                                                                                                         300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        180
                                                                                                     711
                                                                                                                       715
                                                                                                                                           651
                                                                                                                                                                                  594
                                                                                                                                                                                                       595
                                                                                                                                                                                                                         534
                                                                                                                                                                                                                                                                                                        414
                                                                                                                                                                                                                                                                                                                                              354
                                                                                                                                                                                                                                                                                                                                                                                                                             234
                                                                                                                                                                                                                                                                                                                                                                                                                                               240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                   174
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           114
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              120
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  54
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      60
                                                        Š
                                                                                 B.
                                                                                                                B,
                                                                                                                                      Ś
                                                                                                                                                              맑
                                                                                                                                                                           δ
                                                                                                                                                                                                     망
                                                                                                                                                                                                                    δ
                                                                                                                                                                                                                                                            δ
                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                                                Ş
                                                                                                                                                                                                                                                                                                                                                                                                         片
                                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                          B
                                                                                              8
                                                                                                                                                                                                                                             B
                                                                                                                                                                                                                                                                                                  S
                                                                                                                                                                                                                                                                                                                                          Ş
                                                                                                                                                                                                                                                                                                                                                                В
                                                                                                                                                                                                                                                                                                                                                                                                                           Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Query Match
Best Local (
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Matches 522;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              TYPE: PRT
                                          652
                                                                                 595
                                                                                                969
                                                                                                                       535
                                                                                                                                           540
                                                                                                                                                               475
                                                                                                                                                                                                      415
                                                                                                                                                                                                                                             355
                                                                                                                                                                                                                                                               361
                                                                                                                                                                                                                                                                                                                                                                  175
                                                                                                                                                                                                                                                                                                                                                                                                         115
                                                            959
                                                                                                                                                                                  480
                                                                                                                                                                                                                          420
                                                                                                                                                                                                                                                                                     295
                                                                                                                                                                                                                                                                                                        301
                                                                                                                                                                                                                                                                                                                            235
                                                                                                                                                                                                                                                                                                                                              241
                                                                                                                                                                                                                                                                                                                                                                                     181
                                                                                                                                                                                                                                                                                                                                                                                                                             121
                                                                                                                                                                                                                                                                                                                                                                                                                                               55
                                                                                                                                                                                                                                                                                                                                                                                                                                                                   61
                                                     PRWHDAFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAISLTREVRNRFWQTPSSQ
                                                                                                                       ALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEVKVKDD
                                           SPALSYLSPRIQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNVL
                                                                                                                                   AAYTSELGHLANPUTTHVQPAEMANQAVNSLALISARRTTESNDVLSLLLATHLYCVLQA
                                                                                                                                                                              AAYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQA
                                                                                                                                                                                                                                             EGILRODRYPLRTSPOWLGPLVSDLIHAHAVLTIEAGQSTTDNPLIDVENKTSHHGGNFQ
                                                                                                                                                                                                                                                          EGILRQDRYPLRTSPQFLGPLVEDMMHAYSTLSLE-NNTTTDNPLLDVENKQTAHGGNFQ
                                                                                                                                                                                                                                                                                      SITAMTVEAMVGHAGSFHPFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEVKVKDD
```

US/10476198

VKMLA

SISLAAVNAWKVAAAESAISLTRQVRETFWSAASTS

715

655

594 595 534 539

651

474 479 419

354 360

```
; ORGANISM: artificial sequence ; FEATURE: , OTHER INFORMATION: mutant from rhodotorula US-10-476-198-24
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   GENERAL INFORMATION:
APPLICANT: Sariasiani, Sima
APPLICANT: Tang, Xiao-Song
APPLICANT: Qi, wei Wei
TITLE OF INVENTION: Methods for the Production of Tyrosine, Cinnamic Acid and
TITLE OF INVENTION: hydroxycinnamic Acid
FILE REFERENCE: CL1777
CURRENT APPLICATION NUMBER: US/10/476,198
CURRENT FILING DATE: 2003-10-24
NUMBER OF SEQ ID NOS: 24
SOFTWARE: Microsoft Office 97
SEQ ID NO 24
LENGTH: 716
THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF THE TANGE OF 
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1 MAPSIDSIATTIANGFTNGSHAAPTKSAAGPTSALRRTPGIDGHAAHQSQLEIVQEILSD
|||||||:::|::|:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Similarity
                                                                                                                                                                                                                      SLTRGHSAVRLVVLEALTNELNHRITPIVPLRGSISASGDLSPLSYIAGAITGHPDVKVH
VVHEGKEKILYAREAMALFNLEPVYLGPKEGLGLVNGTAVSASMATLALHDAHMLSILSQ
                                                                           VLHEGTEKIMFAREAISLFGLEAVVLGPKEGLGLVNGTAVSASMATLSLHDSHMLSLLSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          GFGGSADTRTEDAVSLOKALIEHQLCGVTPTSXSSFSVGRGLENTLFLEVVRGAMVIRVN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             PTDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDXSVEFLRSQLSMSVYGVTT
                                                                                                                                                                                                                                                                                                                                                                                                                                            GFGGSADTRTEDAISLOKALLEHOLCGVLPSSFDSFRLGRGLENSLPLEVVRGAMTIRVN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  PTDDVVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSVYGVTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         MAPSIDSISHSFANG-----VASAKQAVNGASTNIAVAGSHIPTTQVTQVDIVEKMLAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              72.4%; Score 2612; DB 6; 72.0%; Pred. No. 4.6e-194; tive 85; Mismatches 104;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    glutinis
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Length
                                                                                                                   300
     294
                                                                                                                                                                                                                            234
                                                                                                                                                                                                                                                                                                                                    240
                                                                                                                                                                                                                                                                                                                                                                                                                                                  174
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    180
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  114
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           120
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         5
4
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         ហ
```

651

```
Ŗ
                                                                                                                                                                                                                                                                                                                                                                                                                                      8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   멍
                                                                                                                                               밁
                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                     Ş
                                                                                                                                                                                                                                                                                                                 문
                                                                                                                                                                                                                                                                                                                                                      Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    RESULT 7
US-10-476-193-22
                                                               밁
                                                                                                      8
                                                                                                                                                                                    Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CURRENT APPLICATION NUMBER: US/10/476,193
CURRENT FILING DATE: 2003-10-28
NUMBER OF SEQ ID NOS: 24
SOFTWARE: Microsoft Office 97
SEQ ID NO 22
SEQ ID NO 22
TIENGTH: 716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Query Match
Best Local
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Sequence 22, Application US/10476193 GENERAL INFORMATION:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    APPLICANT: Sariasiani, Sima
APPLICANT: Tang, Xiao-Song
APPLICANT: Qi, Wei Wei
TITLE OF INVENTION: Methods for the Production of Tyrosine, Cinnamic Acid and
TITLE OF INVENTION: hydroxycinnamic Acid
TITLE OF INVENTION: hydroxycinnamic Acid
TELE REFERENCE: CL1777
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      FEATURE:
NAME/KEY: MISC FEATURE
LOCATION: (540)...(540)
OTHER INFORMATION: Xaa=Thr, Ala,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    NAME/KEY: MISC FEATURE LOCATION: (540)...(540) COTHER INFORMATION: x=Thr,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              FEATURE:
NAME/KEY: MISC FEATURE
LOCATION: (502)...(502)
OTHER INFORMATION: x=Gly,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             TYPE: PRT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ORGANISM: Rhodotorula glutinis
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Local Similarity
es 521; Conserv
                          480
                                                                                                      420
                                                                                                                                                 355
                                                                                                                                                                                         361
                                                                                                                                                                                                                                                                         301
                                                                                                                                                                                                                                                                                                                   235
                                                                                                                                                                                                                                                                                                                                                                                                      175
                                                                                                                                                                                                                                                                                                                                                                                                                                        181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           712
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  ហ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          61
AAYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQA 539
                                                                                                                                                                                                                                                                                                                                                                                                                                  SLTRGHSAVRLVVLEALTNFLNHRITPIVPLRGSISASGDLSPLSYIAGAITGHPDVKVH 240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            GFGGSADTRTEDAVSLQKALIEHQLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIRVN 180
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   PTDDVVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSVYGVTT
                                                                                         ASAVSISMEKTRLALALIGKLNFTQCTELLNAAMNRGLPSCLAAEDPSLNYHGKGLDIHI 479
                                                                                                                                                                                                                                                                                                              VVHEGKEKILYAREAMALFNLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLSQ
                                                                                                                                                                                                                                                                                                                                                        VLHEGTEKIMFAREAISLFGLEAVVLGPKEGLGLVNGTAVSASMATLSLHDSHMLSLLSQ 300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   MAPSIDSISHSFANG-----VASAKQAVNGASTNLAVAGSHLPTTQVTQVDIVEKMLAA 54
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          MAPSIDSLATTLANGFTNGSHAAPTKSAAGPTSALRRTPGIDGHAAHQSQLEIVQELISD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         LKMLA 716
                                                                                                                                               EGILRODRYPLRTSPOWLGPLVSDLIHAHAVLTIEAGQSTTDNPLIDVENKTSHHGGNFQ 414
                                                                                                                                                                            EGILRODRYPLRTSPOFIGPLVEDMMHAYSTLSLE-NNTTTDNPLLDVENKQTAHGGNFQ
                                                                                                                                                                                                                                SLTAMTVEAMVGHAGSFHPFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEVKVKDD
                                                                                                                                                                                                                                                                     ALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                                                                   SLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAISGHPDSKVH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    GFGGSADTRTEDAISLQKALLEHQLCGVLPSSFDSFRLGRGLENSLPLEVVRGAMTIRVN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  PTDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVTT 114
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  72.2%; Score 2607; DB 6; ilarity 71.9%; Pred. No. 1.1e-193; Conservative 85; Mismatches 105;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ala,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ala,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ser, Thr,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ser, Pro, Gly
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Pro,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Pro
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Length 716;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    14;
                                                                                                                                                                                                                                                                                                                 294
                                                                                                                                                                                                                                                                                                                                                                                                   234
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    174
                                                                                                                                                                                       419
                                                                                                                                                                                                                                354
                                                                                                                                                                                                                                                                         360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Para-
                                                                                                                                               Вb
                                                                                                                                                                                  Š
                                                                                                                                                                                                                                9
                                                                                                                                                                                                                                                                 Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              US-10-476-198-22; Sequence 22, Application US/10476198; GENERAL INFORMATION:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           8
                                                               멍
                                                                                                    Š
                                                                                                                                                                                                                                                                                                              В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       APPLICANT: Sariasiani, Sima
APPLICANT: Tang, Xiao-Song
APPLICANT: Qi, Wei Wei
PITLE OF INVENTION: Methods for the Production of Tyrosine, Cinnamic J
TITLE OF INVENTION: Mydroxycinnamic Acid
FILE REFERENCE CL1777
CURRENT APPLICATION NUMBER: US/10/476,198
CURRENT APPLICATION NUMBER: US/10/476,198
CURRENT FILING DATE: 2003-10-24
NUMBER OF SEQ ID NOS: 24
SOFTWARE: Microsoft Office 97
SEQ ID NO 252
LENGTH: 716
TYPE: PRT
                                                                                                                                                                                                                                                                                                                                                                                                 Best Local Similarity 71.9 Matches 521; Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                      Query Match
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     NAME/KEY: MISC FEATURE LOCATION: (540)..(540) OTHER INFORMATION: Xaa=Thr, Ala,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    NAME/KEY: MISC FEATURE LOCATION: (502)..(502) OTHER INFORMATION: x=Gly,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      LOCATION: (540) .. (540) OTHER INFORMATION: x=Thr,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            NAME/KEY: MISC_FEATURE LOCATION: (540)...(540)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    FEATURE:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ORGANISM: Rhodotorula glutinis
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         652 SPALSYLSPRTQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNVL 711
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            656 APAHAYLSPRTRVLYSFVREELGVQARRGDVFVGVQQETIGSNVSRIYEAIKDGRINHVL 715
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               540 VDLRAMELDFKKQFDFLLPTLLQQHLG---TGLDV-NALALEVKKALNKRLEQTTTYDLE 595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      475 AAYTSELGHLANPVTTHVQPAEMANQAXNSLALISARRTTESNDVLSLLLATHLYCVLQA
                       241 VLHEGTEKIMFAREAISLEGLEAVVLGPKEGLGLVNGTAVSASMATLSLHDSHMLSLLSQ 300
                                                                                                                                               115 GFGGSADTRTEDAISLOKALLEHOLCGVLPSSFDSFRLGRGLENSLPLEVVRGAMTIRVN
                                                                                                                                                                                121 GFGGSADTRTEDAVSLQKALIEHQLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIRVN 180
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          712 LKMLA 716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               716 VKMLA 720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          535 IDLRAXEFEFKKQFGPAIVSÜIDQHFGSAMTGSNLRDELVEKVNKTLAKRLEQTNSYDLV 594
                                                                                                                                                                                                                              55 PTDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVBFLRSQLSMSVYGVTT 114
                                                                                                                                                                                                                                                            61 PTDDVVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSVYGVTT 120
                                                                                                                                                                                                                                                                                                                   ب
                                                                                                                                                                                                                                                                                                                                                        1 MAPSIDSLATTLANGFINGSHAAPTKSAAGPTSALRRTPGIDGHAAHQSQLEIVQEILSD
                                                                                           SLTRGHSAVRLVVLEALTNFLNHRITPIVPLRGSISASGDLSPLSYIAGAITGHPDVKVH
                                                                                                                                                                                                                                                                                                                 MAPSIDSISHSFANG-----VASAKQAVNGASTNIAVAGSHIPTTQVTQVDIVEKMIAA 54
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | PRWHDAFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAISLTREVRNRFWQTPSSQ 655
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         PRWHDAFSFAAGTVVEVLSST---SLSLAAVNAWKVAAAESAISLTRQVRETFWSAASTS
    72.2%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ala,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ala,
                                                                                                                                                                                                                                                                                                                                                                                                 ; Score 2607; DB 6; ; Pred. No. 1.1e-193; 85; Mismatches 105;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ser,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ser,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Pro,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Gly
                                                                                                                                                                                                                                                                                                                                                                                                                                        Length 716;
                                                                                                                                                                                                                                                                                                                                                                                                   Indels 14;
                                                                                                                                                                                                                                                                                                                                                                                                   Gaps
```

Acid and

Para-

240

60

```
RESULT 9
US-10-476-193-20
Sequence 20, Application US/10476193
GENERAL INFORMATION:
APPLICANT: Sariasiani, Sima
APPLICANT: Tang, Xiao-Song
APPLICANT: Qi, Wei Wei
TITLE OF INVENTION: Methods for the Production of
TITLE OF INVENTION: hydroxycinnamic Acid
FILE REFERENCE: CL1777
CURRENT APPLICATION NUMBER: US/10/476,193
CURRENT APPLICATION NUMBER: US/10/476,193
NUMBER OF SEQ ID NOS: 24
SOFTWARE: Microsoft Office 97
SEQ ID NO 20
LENGTH: 716
                                              ; LOCATION: (540)...(5; OTHER INFORMATION: US-10-476-193-20
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Db
dd
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                DЬ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Дb
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              망
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             δ
      Query Match
Best Local Similarity
                                                                                                                                                                                                                   NAME/KEY: MISC FEATURE LOCATION: (181)..(181) OTHER INFORMATION: X=Pro, / FEATURE:
                                                                                                     LOCATION: (540)...(540)
OTHER INFORMATION: X=Thr,
FEATURE:
                                                                                                                                                                         NAME/KEY: MISC FEATURE LOCATION: (235)..(235) OTHER INFORMATION: X=Ala,
                                                                                                                                       PEATURE:
NAME/KEY: MISC FEATURE
(540)
                                                                                                                                                                                                                                                                                     TYPE: PRT CRGANISM: Rhodotorula glutinis
                                                                                       NAME/KEY: MISC_FEATURE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        652
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    656
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           596
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       535
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 475
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       415
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                355
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       295
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            235
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 712
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           VKMLA 720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      PRWHDAFS FAAGTVVEVLSST---SLSLAAVNAWKVAAAESAISLTRQVRETFWSAASTS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     VDLRAMELDFKKQFDFLLFTLLQQHLG----TGLDV-NALALEVKKALNKRLEQTTTYDLE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   AAYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         ASAVSISMEKTRLALALIGKLNFTQCTELLNAAMNRGLPSCLAAEDPSLNYHGKGLDIHI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             EGILRQDRYPLRTSPQWLGPLVSDLIHAHAVLTIEAGQSTTDNPLIDVENKTSHHGGNFQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              EGILRQDRYPLRTSPOFLGPLVEDMMHAYSTLSLE-NNTTTDNPLLDVENKQTAHGGNFQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     SLTAMTVEAMVGHAGSTHPFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                ALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 LKMLA 716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   PRWHDAFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAISLTREVRNRFWQTPSSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   IDLRAXEFEFKKQFGPAIVSLIDQHFGSAMTGSNLRDELVEKVNKTLAKRLEQTNSYDLV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       AAAVANTMEKTRLGLAQIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              AAYTSELGHLANPVTTHVQPAEMANQAXNSLALISARRTTESNDVLSLLLATHLYCVLQA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            VVHEGKEKILYAREAMALFNLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLSQ
                                                            .(540)
N: Xaa=Thr,
      72.1%;
71.7%;
                                                                                                                  Ala,
                                                                                                                                                                         Gly,
                                                                                                                                                                                                                                  Ala,
                                                            Ala,
       Score 2603; DB 6;
Pred. No. 2.3e-193
                                                                                                                     Ser,
                                                                                                                                                                          Ser,
                                                                                                                                                                                                                                   Ser,
                                                             Ser,
                                                                                                                    Pro,
                                                                                                                                                                                                                                  Thr,
                                                                                                                                                                            Thr,
                                                            Pro,
                                                                                                                     617
                                                                                                                                                                                                                                  Gly
                                                             Gly
                                                                                                                                                                                                                                                                                                                                                                                                                                      O.f
                                                                                                                                                                                                                                                                                                                                                                                                                                      Tyrosine,
                     Length 716;
                                                                                                                                                                                                                                                                                                                                                                                                                                      Cinnamic
                                                                                                                                                                                                                                                                                                                                                                                                                                      Acid
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          . 539
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    479
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       594
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         711
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   715
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               651
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           655
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              534
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       474
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     354
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               414
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          419
                                                                                                                                                                                                                                                                                                                                                                                                                                      and
                                                                                                                                                                                                                                                                                                                                                                                                                                      Para-
APPLICANT: Sariasiani, Sima
APPLICANT: Tang, Xiao-Song
APPLICANT: Tang, Xiao-Song
APPLICANT: Qi, Wei Wei Wei
TITLE OF INVENTION: Methods for the Production of
TITLE OF INVENTION: hydroxycinnamic Acid
FILE REFERENCE: CL1777
CURRENT APPLICATION NUMBER: US/10/476,193
CURRENT FILING DATE: 2003-10-28
NUMBER OF SEQ ID NOS: 24
SOFTWARE: Microsoft Office 97
SEQ ID NO 21
LENGTH: 716
TYPE: PRT
ORGANISM: Rhodotorula glutinis
                                                                                                                                                                                                                                  US-10-476-193-21
                                                                                                                                                                                                                                                                                                                                                  맑
                                                                                                                                                                                                                                                                                                                                                                           S
                                                                                                                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                                                                                                                  Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                  δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                       Sequence 21, Application US/10476193 GENERAL INFORMATION:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Matches
                                                                                                                                                                                                                                                                                                                                                  595
                                                                                                                                                                                                                                                                                                                                                                                                                                      596
                                                                                                                                                                                                                                                                                                                                                                                                                                                                   535
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         475
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 415
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         355
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 295
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         235
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 175
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       115
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    121
                                                                                                                                                                                                                                                                                                                     716 VKMLA
                                                                                                                                                                                                                                                                                           712 LKMLA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               55
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             520;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     ,..
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1 MAPSIDSLATTIANGFTNGSHAAPTKSAAGPTSALRRTPGLDGHAAHQSQLEIVQELLSD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  VDLRAMELDFKKQFDPLLFTLLQQHLG----TGLDV-NALALEVKKALNKRLEQTTTYDLE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        ASAVSISMEKTRIALALIGKINFTQCTELLNAAMNRGLPSCLAAEDPSLNYHGKGLDIHI 479
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GFGGSADTRTEDAVSLQKALIEHQLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIRVN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              PTDDVVZLSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSVYGVTT
                                                                                                                                                                                                                                                                                                                                                                                                           PRWHDAFSFAAGTVVEVLSST---SLSLAAVNAWKVAAAESAISLTRQVRETFWSAASTS
                                                                                                                                                                                                                                                                                                                                                                                                                               PRWHDAFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAISLTREVRNRFWQTPSSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                 IDLRAXEFEFKKQFGPAIVSLIDQHFGSAMTGSNLRDELVEKVNKTLAKRLEQTNSYDLV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         AAYTSELGHLANPVTTHVQPAEMANQAVNSLALISARRTTESNDVLSLLLATHLYCVLQA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          AAYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       EGILRQDRYPLRTSPQFLGPLVEDMGHAYSTLSLE-NNTTTDNPLLDVENKQTAHGGNFQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 SLTAMIVEAMVGHAGSFHPFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       XVHEGKEKILYAREAMALFNLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               VLHEGTEKIMFAREAISLFGLEAVVLGPKEGLGLVNGTAVSASMATLSLHDSHMLSLLSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               SITRGHXAVRLVVLEALINFLNHGITPIVPLRGTISASGDLSPLSYIAAAISGHPDSKVH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 SLTRGHSAVRLVVLEALTNFLNHRITPIVPLRGSISASGDLSPLSYIAGAITGHPDVKVH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                PTDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       MAPSIDSISHSFANG-----VASAKQAVNGASTNLAVAGSHLPTTQVTQVDIVEKMLAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   AAAVANTMEKTRIGIAQIGKINFTQITEMINAGMNRGIPSCLAAEDPSISYHCKGIDIAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         EGILRODRYPLRTSPOWLGPLVSDLIHAHAVLTIEAGQSTTDNPLIDVENKTSHHGGNFQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       GFGGSADTRTEDAISLQKALLEHQLCGVLPSSFDSFRLGRGLENSLPLEVVRGAMTIRVN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Conservative
                                                                                                                                                                                                                                                                                                                       720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             85;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Mismatches . 106;
                                                                                                                                                  of Tyrosine,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Indels
                                                                                                                                                   Cinnamic Acid and
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             14;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Gaps
                                                                                                                                                                                                                                                                                                                                                                                 715
                                                                                                                                                                                                                                                                                                                                                                                                                                        655
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      419
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    180
                                                                                                                                                                                                                                                                                                                                                                                                                                                                    594
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         534
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      539
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   474
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           414
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  354
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          294
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         174
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                114
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            120
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       5
4
                                                                                                                                                                                                                                                                                                                                                     711
                                                                                                                                                                                                                                                                                                                                                                                                             65
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 234
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               ຫ
```

Para-

```
Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                망
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                B
                                                                                     S
                                                                                                                        밁
                                                                                                                                                                                                                    Ś
                                                                                                                                                                                                                                                                                Š
                                                                                                                                                                                                                                                                                                                                                Š
                                                                                                                                                                                                                                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                                                                                                                                            Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                            밁
                       S
                                                          밁
                                                                                                                                                                                    뫄
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            US-10-476-193-21
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Query Match
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     LOCATION: (202)...(202)
OTHER INFORMATION: X=Val, I
FEATURE:
NAME/KEY: MISC FEATURE
LOCATION: (540)...(540)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         FEATURE:
NAME/KEY: MISC FEATURE
TOCATION: (202)...(202)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         NAME/KEY: MISC FEATURE LOCATION: (540)..(540) OTHER INFORMATION: Xaa=Thr,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       LOCATION: (540)..(540)
OTHER INFORMATION: X=Thr,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                FEATURE:
NAME/KEY: MISC_FEATURE
LOCATION: (149)..(149)
OTHER INFORMATION: X=Pro,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Local
                                                                                                                                                                                                                                                      475
                                                                                                                                                                                                                                                                                                                    415
                                                                                                                                                                                                                                                                                                                                                                                355
                                                                                                                                                                                                                                                                                                                                                                                                              361
                                                                                                                                                                                                                                                                                                                                                                                                                                            295
                                                                                                                                                                                                                                                                                                                                                                                                                                                                          301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          235
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      181
712
                                                                                                                                                                                      535
                                                                                                                                                                                                                                                                                  480
                                                                                                                                                                                                                                                                                                                                                420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              520;
                                                                                          656
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  55
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1 MAPSLDSLATTLANGFTNGSHAAPTKSAAGPTSALRRTPGLDGHAAHQSQLEIVQELLSD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Similarity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    GFGGSADTRTEDAISLQKALLEHQLCGVLPSSFDXFRLGRGLENSLPLEVVRGAMTIRVN 174
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        GFGGSADTRTEDAVSLQKALIEHQLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIRVN 180
                            VKMLA 720
                                                                                                                                                                                                                                                                                                                                                                                                      EGILRQDRYPLRTSPQFLGPLVEDMMHAYSTLSLE-NNTITUNPLLDVENKQTAHGGNFQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        VVHEGKEKILYAREAMALFNLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            SITRGHSAVRLVVLEALTNFLNHRITPIVPLRGSISASGDLSPLSYIAGAITGHPDVKVH
                                                            SPALSYLSPRIQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNVL
                                                                                     APAHAYLSPRTRVLYSFVREELGVQARRGDVFVGVQQETIGSNVSRIYEAIKDGRINHVL
                                                                                                                          PRWHDAFSFAAGTVVEVLSST---SLSLAAVNAWKVAAAESAISLTRQVRETFWSAASTS
                                                                                                                                            PRWHDAFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAISLTREVRNRFWQTPSSQ
                                                                                                                                                                                      VDLRAMELDEKKOFDPILETLIQQHIG---TGLDV-NALALEVKKALNKRLEQTTTYDLE
                                                                                                                                                                                                                                                    AAYTSELGHLANPVTTHVQPAEMANQAVNSLALISARRTTESNDVLSLLLATHLYCVLQA
                                                                                                                                                                                                                                                                           AAYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQA 539
                                                                                                                                                                                                                                                                                                                  AAAVANTMEKTRIGIAQIGKINFTQITEMINAGMNRGIPSCLAAEDPSISYHCKGIDIAA
                                                                                                                                                                                                                                                                                                                                         ASAVSISMEKTRLALALIGKLNFTQCTELLNAAMNRGLPSCLAAEDPSLNYHGKGLDIHI 479
                                                                                                                                                                                                                                                                                                                                                                                EGILRODRYPLRTSPQWLGPLVSDLIHAHAVLTIEAGQSTTDNPLIDVENKTSHHGGNFQ
                                                                                                                                                                                                                                                                                                                                                                                                                                              SLTAMTVEAMVGHAGSFHPFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                          ALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      VLHEGTEKIMFAREAISLFGLEAVVLGPKEGLGLVNGTAVSASMATLSLHDSHMLSLLSQ 300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        SLTRGHSAVRLVVLEALTNFLNHGITPXVPLRGTISASGDLSPLSYIAAAISGHPDSKVH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                PTDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVTT 114
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                PTDDVVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSVYGVTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              MAPSIDSISHSFANG-----VASAKQAVNGASTNLAVAGSHLPTTQVTQVDIVEKMLAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Conservative
716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             72.1%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Met,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ala,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ala,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            85,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Score 2603; DB 6;
Pred. No. 2.3e-193;
5; Mismatches 106;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ser,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Leu,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ser,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Thr,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Pro,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Gly
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Gly
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Length 716;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              14;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Gaps
                                                                                                                                                                                                                                                                                                                                                                                                              419
                                                                                            715
                                                                                                                          651
                                                                                                                                                                                        594
                                                                                                                                                                                                                      595
                                                                                                                                                                                                                                                      534
                                                                                                                                                                                                                                                                                                                    474
                                                                                                                                                                                                                                                                                                                                                                                414
                                                                                                                                                                                                                                                                                                                                                                                                                                              354
                                                                                                                                                                                                                                                                                                                                                                                                                                                                            360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          294
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  120
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                5
4
```

```
; NAME/KEY: MISC FEATURE ; LOCATION: (540) ...(540) ...
OTHER INFORMATION: Xaa=Thr, Ala, US-10-476-198-20
                                                                                          Ş
                                                                                                                               밁
                                                                                                                                                                                                                             Ş
                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                             Š
                                                                                                                                                                                                                                                                                                                                      밁
                                                                                                                                                                                                                                                                                                                                                                   Ş
                                                                                                                                                                                                                                                                                                                                                                                                      밁
                                                                                                                                                                                                                                                                                                                                                                                                                                  Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                      밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 RESULT 11
US-10-476-198-20
                        Ó
                                                              밁
                                                                                                                                                            Ó
                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       APPLICANT: Sariasiani, Sima
APPLICANT: Tang, Xiao-Song
APPLICANT: Qi, wei Wei
PITTLE OF INVENTION: Methods for the Production of Tyrosine, Cinnamic Acid and Para-
TITLE OF INVENTION: hydroxycinnamic Acid
FILE REFERENCE: CL1777
CURRENT APPLICATION NUMBER: US/10/476,198
CURRENT FILING DATE: 2003-10-24
NUMBER OF SEQ ID NOS: 24
SOFTWARE: Microsoft Office 97
SEQ ID NO 20
LENGTH: 716
TYPE: PRT
ORGANISM: Rhodotorula glutinis
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Query Match
Best Local S
Matches 520
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Sequence 20, Application US/10476198 GENERAL INFORMATION:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       NAME/KEY: MISC FEATURE
LOCATION: (540)..(540)
OTHER INFORMATION: X=Thr,
FEATURE:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           NAME/KEY: MISC FEATURE LOCATION: (235)..(235) OTHER INFORMATION: X=Ala,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       NAME/KEY: MISC FEATURE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           LOCATION: (181) ... (181)
OTHER INFORMATION: X=Pro,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Local Similarity
nes 520; Conserv
                                                               355
                                                                                               361
                                                                                                                                 295
                                                                                                                                                                 301
                                                                                                                                                                                                   235
                                                                                                                                                                                                                                   241
                                                                                                                                                                                                                                                                      175
                                                                                                                                                                                                                                                                                                      181
                                                                                                                                                                                                                                                                                                                                        115
                                                                                                                                                                                                                                                                                                                                                                      121
                                                                                                                                                                                                                                                                                                                                                                                                        55
                                                                                                                                                                                                                                                                                                                                                                                                                                      61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                        μ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1 MAPSIDSLATTLANGFTNGSHAAPTKSAAGPTSALRRTPGLDGHAAHQSQLEIVQELLSD
                                                                                                                                                                                                   XVHEGKEKILYAREAMALFNLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLSQ
                                                                                                                                                                                                                                                                                                                                                                                                                               PTDDVVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSVYGVTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                        MAPSLDSISHSFANG-----VASAKQAVNGASTNLAVAGSHLPTTQVTQVDIVEKMLAA
                                                                                                                                                                                                                          VLHEGTEKIMFAREÁISLFGLEAVVLGPKEGLGLVNGTAVSASMATLSLHDSHMLSLLSQ 300
                                                                                                                                                                                                                                                                                                                                      GFGGSADTRTEDAISLQKALLEHQLCGVLFSSFDSFRLGRGLENSLFLEVVRGAMTIRVN 174
                                                                                                                                                                                                                                                                                                                                                                 GFGGSADTRTEDAVSLQKALIEHQLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIRVN
                                                                                            EGILRODRYFLRTSPOFIGFLVEDMMHAYSTLSLE-NNTTTDNFLLDVENKQTAHGGNFQ
                                                                                                                                                          ALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTILLSGSSFAVEHEEEVKVKDD
                                                                                                                                                                                                                                                                    SLTRGHXAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAISGHPDSKVH
                                                                                                                                                                                                                                                                                          SLTRGHSAVRLVVLEALINFLNHRITDIVPLRGSISASGDLSPLSYIAGAITGHPDVKVH
                                                                                                                                                                                                                                                                                                                                                                                                        PTDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVTT
ASAVSISMEKTRLALIGKLNFTQCTELLNAAMNRGLESCLAAEDPSLNYHGKGLDIHI 479
                                                              EGILRODRYPLRTSPOWLGPLVSDLIHAHAVLTIEAGQSTTDNPLIDVENKTSHHGGNFQ
                                                                                                                                   SLTAMTVEAMVGHAGSFHPFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        72.1%; Score 2603; DB 6; ilarity 71.7%; Pred. No. 2.3e-193; Conservative 85; Mismatches 106;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ala,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Gly,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ala,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ser,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ser,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ser,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ser,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Thr,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Pro,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Pro,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Pro
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Gly
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Gly
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Length 716;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         14;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                         54
   474
                                                                                                   419
                                                                                                                                                                                                      294
                                                                                                                                                                                                                                                                        234
                                                                                                                                                                                                                                                                                                      240
                                                                                                                                                                                                                                                                                                                                                                                                                                          120
                                                                   414
                                                                                                                                   354
                                                                                                                                                                     360
```

```
Sequence 21, Application US/10476198
GENERAL INFORMATION:
APPLICANT: Sariasian; Sima
APPLICANT: Tang, Xiao-Song
APPLICANT: Tang, Xiao-Song
APPLICANT: Qi, Wei Wei
ITITLE OF INVENTION: Methods for the Production of
ITITLE OF INVENTION: hydroxycinnamic Acid
FILS REFERENCE: C11777
CURRENT APPLICATION UNMBER: US/10/476,198
CURRENT FILING DATE: 2003-10-24
UNMBER OF SEQ ID NOS: 24
SOPTWARE: Microsoft Office 97
SEQ ID NO 21
LENGTH: 716
                                             Ś
                                                                                             밁
                                                                                                                             5
                                                                                                                                                                        밁
                                                                                                                                                                                                                      Ś
                                                                                                                                                                                                                                                                                                                                                            ; NAME/KEY: MISC FEATURE ; LOCATION: (540) . (540) . (540) ; OTHER INFORMATION: Xaa=Thr, US-10-476-198-21
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            RESULT 12
US-10-476-198-21
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Дb
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                          Matches
                                                                                                                                                                                                                                                                                                                 Query Match
                                                                                                                                                                                                                                                                                                                                                                                                                                                                NAME/KEY: MISC FEATURE LOCATION: (540)..(540) OTHER INFORMATION: X=Thr,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       NAME/KEY: MISC FEATURE LOCATION: (149)...(149) OTHER INFORMATION: X=Pro,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       PEATURE:
NAME/KEY: MISC FEATURE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           TYPE: PRT
ORGANISM: Rhodotorula glutinis
                                                                                                                                                                                                                                                                                                                                                                                                                                                   FEATURE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       OTHER INFORMATION: X=Val,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           FEATURE:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           LOCATION:
                                                                                                                                                                                                                                                            72.1%;
Local Similarity 71.7%;
es 520; Conservation
             115
                                                      121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  712
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    652
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             656
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               596
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        535
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               475
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      480
                                                                                                 ភូ
                                                                                                                                          61
                                                                                                                                                                                   \vdash
                                                                                                                                                                                                                            بر
                                             GFGGSADTRTEDAVSLQKALIEHQLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIRVN
               GFGGSADTRTEDAISLOKALLEHOLCGVLPSSFDXFRLGRGLENSLPLEVVRGAMTIRVN
                                                                                               PTDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVTT
                                                                                                                                 PTDDVVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSVYGVTT
                                                                                                                                                                                 MAPSIDSISHSFANG-----VASAKQAVNGASTNIAVAGSHLPTTQVTQVDIVEKMIAA
                                                                                                                                                                                                                          MAPSIDSLATTLANGFTNGSHAAPTKSAAGPTSALRRTPGIDGHAAHQSQLEIVQELLSD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  LKMLA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    SPALSYLSPRTQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNVL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    APAHAYLSPRTRVLYSFVREELGVQARRGDVFVGVQQETIGSNVSRIYEAIKDGRINHVL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        AAYASELGHLANPVTTEVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         VKMLA 720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    PRWHDAFSFAAGTVVEVLSST---SLSLAAVNAWKVAAAESAISLTRQVRETFWSAASTS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                PRWHDAFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAISLTREVRNRFWQTPSSQ 655
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      IDLRAXEFEFKKÖFGPAIVSLIDQHFGSAMTGSNLRDELVEKVNKTLAKKLEQTNSYDLV 594
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               VDLRAMELDFKKQFDFLLFTLLQQHLG---TGLDV-NALALEVKKALNKRLEQTTTYDLE 595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              ..(202)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ala,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ala,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Met,
                                                                                                                                                                                                                                                                     85;
                                                                                                                                                                                                                                                                                                                                                                                 Ala,
                                                                                                                                                                                                                                                                     Score 2603; DB 6;
Pred. No. 2.3e-193;
15; Mismatches 106;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ser,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Leu,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ser,
                                                                                                                                                                                                                                                                                                                                                                                 Ser,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Pro,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Thr,
                                                                                                                                                                                                                                                                                                                                                                              Pro,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Gly
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           617
                                                                                                                                                                                                                                                                                                                                                                                 Gly
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        of Tyrosine,
                                                                                                                                                                                                                                                                                                              Length 716;
                                                                                                                                                                                                                                                                          Indels
                                                                                                                                                                                                                                                                     14;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Cinnamic
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Acid
                                                        180
                                                                                                                                        120
                                                                                                                                                                                   54
                                                                                                                                                                                                                               60
               174
                                                                                                 114
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    711
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             715
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      651
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             534
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               and
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Para-
                                                                                                                                                                                                                                                                                                                              APPLICANT: Sariasiani, Sima
APPLICANT: Tang, Xiao-Song
APPLICANT: Tang, Xiao-Song
APPLICANT: Tang, Xiao-Song
APPLICANT: Tang, Xiao-Song
APPLICANT: Tang, Xiao-Song
APPLICANT: Tang, Xiao-Song
APPLICANT: Tang, Xiao-Song
TITLE OF INVENTION: Methods for the Production of
TITLE OF INVENTION: hydroxycinnamic Acid
TITLE OF INVENTION: hydroxycinnamic Acid
TITLE OF INVENTION: hydroxycinnamic Acid
TITLE OF INVENTION: Methods for the Production of
TITLE OF INVENTION: hydroxycinnamic Acid
TITLE OF INVENTION: Motor Methods
TITLE OF INVENTION: Motor Methods
TITLE OF INVENTION: Motor Methods
TITLE OF INVENTION: Motor Methods
TITLE OF INVENTION: Motor Methods
TITLE OF INVENTION: Motor Methods
TITLE OF INVENTION: Motor Methods for the Production of
TITLE OF INVENTION: Motor Methods for the Production of
TITLE OF INVENTION: Motor Methods for the Production of
TITLE OF INVENTION: Motor Methods for the Production of
TITLE OF INVENTION: Motor Methods for the Production of
TITLE OF INVENTION: Motor Methods for the Production of
TITLE OF INVENTION: Motor Methods for the Production of
TITLE OF INVENTION: Motor Methods for the Production of
TITLE OF INVENTION: Motor Methods for the Production of
TITLE OF INVENTION: Motor Methods for the Production of
TITLE OF INVENTION: Motor Methods for the Production of
TITLE OF INVENTION: Motor Methods for the Production of
TITLE OF INVENTION: Motor Methods for the Production of
TITLE OF INVENTION: Motor Methods for the Production of
TITLE OF INVENTION: Motor Methods for the Production of
TITLE OF INVENTION: Motor Methods for the Production of
TITLE OF INVENTION: Motor Methods for the Production of
TITLE OF INVENTION: Motor Methods for the Production of
TITLE OF INVENTION: Motor Methods for the Production of
TITLE OF INVENTION: Motor Methods for the Production of
TITLE OF INVENTION: Motor Methods for the Production of
TITLE OF INVENTION: Motor Methods for the Production of
TITLE OF INVENTION: Motor Methods for the Production of
TITLE OF INVENTION: Motor Methods for the Production of
TITLE OF INVENTIO
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           US-10-476-193-18
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                문
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Sequence 18, Application US/10476193 GENERAL INFORMATION:
OTHER INFORMATION: X=Thr,
-10-476-193-18
                                                                                                                    FEATURE:
NAME/KEY: MISC_FEATURE
LOCATION: (138)...(138)
OTHER INFORMATION: X=Leu,
                                                                                                                                                                                                                                                                                        LENGTH: 716
TYPE: PRT
ORGANISM: Rhodotorula glutinis
                                                      NAME/KEY: MISC FEATURE LOCATION: (540)..(540)
                                                                                                                                                                                                        OTHER INFORMATION: X=Gly,
                                                                                                                                                                                                                            NAME/KEY: MISC FEATURE LOCATION: (126)..(126)
                                                                                                                                                                                                                                                                          FEATURE:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 652
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          656
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               596
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        535
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            475
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                415
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  355
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               712 LKMLA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        716 VKMLA 720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      295
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        235
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 SPALSYLSPRIQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNVL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          APAHAYLSPKTRVLYSFVREELGVQARRGDVFVGVQQETIGSNVSRIYEAIKDGRINHVL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 PRWHDAFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAISLTREVRNRFWQTPSSQ 655
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        IDLRAXEFEFKKQFGPAIVSLIDQHFGSAMTGSNLRDELVEKVNKTLAKRLEQTNSYDLV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            VDLRAMELDFKKQFDPLLPTLLQQHLG---TGLDV-NALALEVKKALNKRLEQTTTVDLE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       AAYASELGHLANDVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ASAVSISMEKTRLALALIGKLNFTQCTELLNAAMNRGLPSCLAAEDPSLNYHGKGLDIHI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  EGILRODRYPLRTSPOWLGPLVSDLIHAHAVLTIEAGOSTTDNPLIDVENKTSHHGGNFQ 414
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  EGILRQDRYPLRTSPQPLGPLVEDMMHAYSTLSLE-NNTTTDNPLLDVENKQTAHGGNFQ 419
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    SLTAMTVEAMVGHAGSFHPFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           ALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEVKVKDD 360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             SLTRGHSAVRLVVLEALTNFLNHGITEXVPLRGTISASGDLSPLSYIAAAISGHPDSKVH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      SLTRGHSAVRLVVLEALTNFLNHRITPIVPLRGSISASGDLSPLSYIAGAITGHPDVKVH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              AAAVANTMEKTRIGLAQIGKINFTQITEMINAGMNRGLPSCLAAEDPSISYHCKGIDIAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        VVHEGKEKILYAREAMALFNLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               VLHEGTEKIMFAREAISLFGLEAVVLGPKEGLGLVNGTAVSASMATLSLHDSHMLSLLSQ 300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               716
                                    Ala,
                                                                                                                                                                                                        Ala,
                                                                                                                    Ile,
                                                                                                                                                                                                        Ser,
                                      Ser,
                                    Pro,
                                                                                                                        Val,
                                                                                                                                                                                                          Thr
                                      6TA
                                                                                                                      Cys
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              of Tyrosine,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Cinnamic Acid and
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          715
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          594
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     539
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                474
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           479
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        294
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      354
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            534
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             234
```

Para

Gaps

54

60

```
RESULT 14

US-10-476-198-18

Sequence 18, Application US/10476198

SEQUENCEL INFORMATION:

APPLICANT: Sariasiani, Sima
APPLICANT: Tang, Xiao-Song
APPLICANT: Tang, Xiao-Song
APPLICANT: OI, Wei Wei
TITLE OF INVENTION: Methods for the Production of Tyr
TITLE OF INVENTION: Mydroxycinnamic Acid
FILE REFERENCE: CL1777

CURRENT APPLICATION NUMBER: US/10/476,198

CURRENT FILING DATE: 2003-10-24

NUMBER OF SEQ ID NOS: 24

SOFTWARE: Microsoft Office 97

SEQ ID NO 18
                                                                                                                                                                                                                                                                                                                                         ß
                                                                                                                                                                                                                                                                                                                                                                8
                                                                                                                                                                                                                                                                                                                                                                                                     B
                                                                                                                                                                                                                                                                                                                                                                                                                                 Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           뮹
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      δÃ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       멼
                                                                                                                                                                                                                                                                                                      Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Query Match
Best Local Similarity
Matches 520; Conserv
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                475
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  175
                                                                                                                                                                                                                                                                                                         716
                                                                                                                                                                                                                                                                                                                                         652
                                                                                                                                                                                                                                                                                                                                                                        656
                                                                                                                                                                                                                                                                                                                                                                                                                                                                    535
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             415
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         355
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       295
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    235
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             121
                                                                                                                                                                                                                                                                          712 LKMLA 716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             55
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      \vdash
                                                                                                                                                                                                                                                                                                                                     SLTRGHSAVRLVVLEALTNFLNHRITPIVPLRGSISASGDLSPLSYIAGAITGHPDVKVH 240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  VHEGKEXILYAREAMALFNLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSILSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 GFGGSADTRTEDAVSLQKALIEHQLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIRVN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             PTDDVVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSVYGVTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     MAPSIDSISHSFANG-----VASAKQAVNGASTNLAVAGSHLPTTQVTQVDIVEKMLAA
                                                                                                                                                                                                                                                                                                         VKMLA 720
                                                                                                                                                                                                                                                                                                                                                                                                                    PRWHDAFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAISLTREVÆNRFWQTFSSQ 655
                                                                                                                                                                                                                                                                                                                                                                                                                                                                  IDLRAXEFEFKKQFGPAIVSLIDQHFGSAMTGSNLRDELVEKVNKTLAKRLEQTNSYDLV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         VDLRAMELDFKKQFDPLLFTLLQQHLG---TGLDV-NALALEVKKALNKRLEQTTTYDLE 595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              AAYTSELGHLANPVTTHVQPAEMANQAVNSLALISARRTTESNDVLSLLLATHLYCVLQA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       AAYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           AAAVANTMEKTRIGIAQIGKINETQLTEMINAGMNRGLPSCIAAEDPSISYHCKGIDIAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         EGILRODRYPLRTSPOWLGPLVSDLIHAHAVLTIEAGOSTTDNPLIDVENKTSHHGGNFQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        SLTAMTVEAMVGHAGSFHPFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         ALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               VLHEGTEKIMFAREAISLFGLEAVVLGPKEGLGLVNGTAVSASMATLSLHDSHMLSLLSQ 300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            GFGGSADTRTEXAISLQKALLEHXLCGVLPSSFDSFRLGRGLENSLPLEVVRGAMTIRVN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     MAPSIDSLATTIANGFTNGSHAAPTKSAAGPTSALRRTPGLDGHAAHQSQLEIVQELLSD
                                                                                                                                                                                                                                                                                                                                                                                                      PRWHDAFSFAAGTVVEVLSST---SLSLAAVNAWKVAAAESAISLTRQVRETFWSAASTS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           ASAVSISMEKTRLALALIGKLNFTQCTELLNAAMNRGLPSCLAAEDPSLNYHGKGLDIHI 479
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     EGILRODRYPLRISPOFLGPLVEDMMHAYSTLSLE-NNTTIDNPLLDVENKQTAHGGNFQ 419
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             PTDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 72.0%; Score 2599; DB 6; Length 716; 71.7%; Pred. No. 4.7e-193; tive 85; Mismatches 106; Indels 1.
                                                                                                                 Tyrosine, Cinnamic
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      14;
                                                                                                                    Acid
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             474
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      294
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             180
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ت
4
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 534
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               174
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             114
                                                                                                                                                                                                                                                                                                                                                                        715
                                                                                                                                                                                                                                                                                                                                                                                                        651
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        354
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         120
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    U
                                                                                                                    and
                                                                                                                    Para-
                                                                                                                                                                                                                                                                                                                                                                                                     В
                                                                                                                                                                                                                                                                                                                                                                                                                                   Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             FEATURE: MISC FEATURE LOCATION: (540)...(540)
OTHER INFORMATION: X=Thr, US-10-476-198-18
                                                                                   밁
                                                                                                             S
                                                                                                                                              B
                                                                                                                                                                       Š
                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                   Ş
                                                                                                                                                                                                                                                                        В
                                                                                                                                                                                                                                                                                                  Š
                                                                                                                                                                                                                                                                                                                                         В
                                                                                                                                                                                                                                                                                                                                                                   Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                  B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                S
                                            Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Query Match
Best Local Similarity 71.7
Matches 520; Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        NAME/KEY: MISC_FEATURE
LOCATION: (138)..(138)
OTHER INFORMATION: X=Leu,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      NAME/KEY: MISC FEATURE LOCATION: (126)...(126) OTHER INFORMATION: X=Gly,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   LENGTH: 716
TYPE: PRT
ORGANISM: Rhodotorula glutinis
FEATURE:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               175
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           115
                                                      716
                                                                                                                                                                                596
                                                                                                                                                                                                              535
                                                                                                                                                                                                                                             540
                                                                                                                                                                                                                                                                             475
                                                                                                                                                                                                                                                                                                           480
                                                                                                                                                                                                                                                                                                                                          415
                                                                                                                                                                                                                                                                                                                                                                        420
                                                                                                                                                                                                                                                                                                                                                                                                        355
                                                                                                                                                                                                                                                                                                                                                                                                                                    361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                     295
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 235
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        55
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1 MAPSIDSIATTLANGFTNGSHAAPTKSAAGFTSALRRTFGIDGHAAHQSQLEIVQEILSD
                                                                                   APAHAYLSPRTRVLYSFVREELGVQARRGDVFVGVQQETIGSNVSRIYEAIKDGRINHVL
:||:||||||::||:|||||||:||
SPALSYLSPRTQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNVL
                                                                                                                                                                                                                                                                                                                                                             ASAVSISMEKTRLALALIGKLNFTQCTELLNAAMNRGLPSCLAAEDPSLNYHGKGLDIHI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    ALTALIVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 VHEGKEKILYAREAMALFNLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           GFGGSADTRTEDAVSLQKALIEHOLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIRVN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         MAPSIDSISHSFANG-----VASAKQAVNGASTNLAVAGSHLPTTQVTQVDIVEKMLAA
                                                                                                                                                                                                                                VDLRAMELDFKKQFDFLLFTLLQQHLG---TGLDV-NALALEVKKALNKKLEQTTTYDLE 595
                                                                                                                                                                                                                                                                          AAYTSELGHLANPVTTHVQPAEMANQAVNSLALISARRTTESNDVLSLLLATHLYCVLQA
                                                                                                                                                                                                                                                                                                                                         AAAVANTMEKTRLGLAQIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     SLTRGHSAVRLVVLEALTNFLNHGITFIVPLRGTISASGDLSPLSYIAAAISGHPDSKVH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        SLTRGHSAVRLVVLEALTNFLNHRITPIVPLRGSISASGDLSPLSYIAGAITGHPDVKVH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          PTDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVTT
                          LKMLA
                                                                                                                                                                         PRWHDAFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAISLTREVRNRFWQTPSSQ 655
                                                                                                                                                                                                                                                                                               AAYASELGHLANPYTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                    SLTAMTVEAMVGHAGSFHPFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           GFGGSADTRTEXAISLQKALLEHXLCGVLPSSFDSFRLGRGLENSLPLEVVRGAMTIRVN
                                                     VKMLA 720
                                                                                                                                                  PRWHDAFSFAAGTVVEVLSST---SLSLAAVNAWKVAAAESAISLTRQVRETFWSAASTS
                                                                                                                                                                                                                                                                                                                                                                                                      EGILRQDRYPLRTSPQWLGPLVSDLIHAHAVLTIEAGQSTTDNPLIDVENKTSHHGGNFQ
                                                                                                                                                                                                                                                                                                                                                                                                                                    EGILRODRYPLRTSPOFLGPLVEDMMHAYSTLSLE-NNTTTDNPLLDVENKQTAHGGNFQ 419
                                                                                                                                                                                                               IDLRAXEFEFKKQFGPAIVSLIDQHFGSAMTGSNLRDELVEKVNKTLAKRLEQTNSYDLV
                          716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 72.0%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ala,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ala,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  85;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Met,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Score 2599; DB 6;
Pred. No. 4.7e-193;
5; Mismatches 106;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ser,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ile, Val,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Pro,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Gly
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Сув
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Length 716;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   14;
```

240 174 180

114

234

534 539 474 479

594

414

354 360 294 300

711

```
US-10-476-193-17

Sequence 17, Application US/10476193

Sequence 17, Application US/10476193

SERNEAL INFORMATION:

APPLICANT: Sariasiani, Sima
APPLICANT: Oli Wei Wei
APPLICANT: Qi, Wei Wei
TITLE OF INVENTION: Methods for the Production of Tyrosine, Cinnamic Acid and Para-
TITLE OF INVENTION: hydroxycinnamic Acid
FILE REFERENCE: CL1177
CURRENT APPLICATION UNMEER: US/10/476,193

CURRENT FILING DATE: 2003-10-28

NUMBER OF SEQ ID NOS: 24

SOFTWARE: Microsoft Office 97

SEQ ID NO 17

LENGTH: 716
   밁
                                               5
                                                                                                                             В
                                                                                                                                                                     Ş
                                                                                                                                                                                                                                      В
                                                                                                                                                                                                                                                                                                         Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          NAME/KEY: MISC FEATURE (540)..(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...(540) ...
                                                                                                                                                                                                                                                                                                                                                                                Query Match
Best Local S
Matches 515
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             PEATURE:
NAME/KEY: MISC FEATURE
LOCATION: (149)...(149)
OTHER INFORMATION: X=Pro, A
FEATURE:
NAME/KEY: MISC FEATURE
LOCATION: (181)...(181)
OTHER INFORMATION: X=Pro, A
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       OTHER INFORMATION: X=Ala, (FEATURE: NAME/KEY: MISC FEATURE LOCATION: (502)..(502) OTHER INFORMATION: X=Gly, FEATURE:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          FEATURE:
NAME/KEY: MISC FEATURE
*OCATION: (235)..(235)
***CATION: (235)..(235)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             NAME/KEY: MISC FEATURE LOCATION: (202)..(202) OTHER INFORMATION: X=Val,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 FEATURE: NAME/KEY: MISC FEATURE LOCATION: (126)..(126) OTHER INFORMATION: X= Gly,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        NAME/KEY: MISC FEATURE
LOCATION: (198)...(198)
OTHER INFORMATION: X=Asp,
FEATURE:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           FEATURE:
NAME/KEY: MISC_FEATURE
LOCATION: (138)..(138)
OTHER INFORMATION: X= Leu,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     TYPE: PRT
ORGANISM: Rhodotorula glutinis
                                                                                                                                                                                                                                                                                                                                                                   Jocal Similarity 71.0%; nes 515; Conservation
                                                                121
115
                                                                                                                                55
                                                                                                                                                                                          61
                                                                                                                                                                                                                                                       Н
                                                                                                                                                                                                                                                                                                                   1 MAPSIDSLATTLANGFTNGSHAAPTKSAAGPTSALRRTPGLDGHAAHQSQLEIVQELLSD 60
                                 GFGGSADTRTEDAVSLQKALIEHQLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIRVN
                                                                                                                                                                                                                                                   MAPSIDSISHSFANG-----VASAKQAVNGASTNLAVAGSHLPTTQVTQVDIVEXMLAA 54
                                                                                                                                                               PTDDVVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSVYGVTT
GFGGSADTRTEXAISLQKALLEHXLCGVLPSSFDXFRLGRGLENSLPLEVVRGAMTIRVN
                                                                                                                             PTDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ala,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Gly,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ala,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Met,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ala,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Asn,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ala,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Met,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ser,
                                                                                                                                                                                                                                                                                                                                                                                96;
                                                                                                                                                                                                                                                                                                                                                                             Score 2579; DB 6;
Pred. No. 1.7e-191;
86; Mismatches 110;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ser,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ser,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ser,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Leu,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Glu,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ser,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ser,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           īle,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ala,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Pro,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Thr,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Thr,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Gln
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Val,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Gly
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Gly
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Gly
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CYE
                                                                                                                                                                                                                                                                                                                                                                                                                                             Length 716;
                                                                                                                                                                                                                                                                                                                                                                             Indels 14;
                                                                                                                                                                                                                                                                                                                                                                                Gaps
                                                                180
                                                                                                                                                                                      120
                                                                                                                             114
```

```
5
                    Ş
                                                   밁
                                                                                                     B
                                                                                                                           8
                                                                                                                                                       맑
                                                                                                                                                                               Ş
                                                                                                                                                                                                            밁
                                                                                                                                                                                                                              Ş
                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                      Ś
                                                                                                                                                                                                                                                                                                                                        S
                                                                                                                                                                                                                                                                                                                                                                                                                      밁
                                                                                                                                                                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                                                                                                   뮍
                                                                                                                                                                                                                                                                                                                                                                                       Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                               Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                          В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                $
                                                    652
2
                                                                                                       595
                                                                                                                                                                                                            475
712
                                                                            959
                                                                                                                                596
                                                                                                                                                          535
                                                                                                                                                                                  540
                                                                                                                                                                                                                                     480
                                                                                                                                                                                                                                                              415
                                                                                                                                                                                                                                                                                         420
                                                                                                                                                                                                                                                                                                                   355
5
                                                                                                                                                                                                                                                                                                                                           361
                                                                                                                                                                                                                                                                                                                                                                     295
                                                                                                                                                                                                                                                                                                                                                                                              301
                                                                                                                                                                                                                                                                                                                                                                                                                       235
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    181
                         716 VKMLA 720
LKMLA
                                                                       APAHAYLSPRTRVLYSFVREELGVQARRGDVFVGVQQETIGSNVSRIYEAIKDGRINHVL
                                                                                                                   VDLRAMELDEKKQEDELLETLLQQHLG---TGLDV-NALALEVKKALNKRLEQTTTYDLE
                                                                                                                                                                                                                                                                              ASAVSISMEKTRLALALIGKLNFTQCTELLNAAMNRGLPSCLAAEDPSLNYHGKGLDIHI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                          SLTRGHSAVRLVVLEALTNFLNHRITPIVPLRGSISASGDLSPLSYIAGAITGHPDVKVH
                                                   SPALSYLSPRTQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNVL
                                                                                                     PRWHDAPSFAAGTVVEVLSST---SLSLAAVNAWKVAAAESAISLTRQVRETFWSAASTS
                                                                                                                                                         IDLRÁTEFEFKKÓFGPATVSLIDÓHFGSAMTGSNIRDELVEKVNKTLAKRIEÓTNSYDLV
                                                                                                                                                                                                            AAYTSELGHLANPVTTHVQPAEMANQAXNSLALISARRTTESNDVLSLLLATHLYCVLQA
                                                                                                                                                                                                                          AAYASELGHLANPYTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQA
                                                                                                                                                                                                                                                                                                                   EGILRODRYPLRTSPOWLGPLVSDLIHAHAVLTIEAGQSTTDNPLIDVENKTSHHGGNFQ
                                                                                                                                                                                                                                                                                                                                 EGILRQDRYPLRTSPQFLGPLVEDMMHAYSTLSLE-NNTTTDNPLLDVENKQTAHGGNFQ
                                                                                                                                                                                                                                                                                                                                                                     SLTAMTVEAMVGHAGSFHPFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                                                          ALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                                                                                       XVHEGKEKILYAREAMALFNLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLSQ 294
                                                                                                                                                                                                                                                                                                                                                                                                                                          VLHEGTEKIMFAREAISLFGLEAVVLGPKEGLGLVNGTAVSASMATLSLHDSHMLSLLSQ 300
                                                                                                                                                                                                                                                              AAAVANTMEKTRIGIAQIGKINFTQITEMINAGMNRGIPSCLAAEDPSISYHCKGIDIAA
 716
                                                                                                                                925
                                                                                                                                                                                                                                                                                         479
                                                                                                                                                                                                                                                                                                                                            419
                                                                                                                                                                                                                                                                                                                                                                                              360
                                                                            715
                                                                                                        655
                                                                                                                                                          594
                                                                                                                                                                                    595
                                                                                                                                                                                                              534
                                                                                                                                                                                                                                       539
                                                                                                                                                                                                                                                                 474
                                                                                                                                                                                                                                                                                                                   414
                                                                                                                                                                                                                                                                                                                                                                     ω
15
14
                                                                                                                                                                                                                                                                                                                                                                                                                                                                           234
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    240
```

Search completed: September 9, 2004, 10:21:12 Job time : 46.8174 secs

```
Title:
Perfect score:
Sequence:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Result
No.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Post-processing: Minimum Match 0%
Maximum Match 100%
Listing first 45 summaries
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Database
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Minimum DB
Maximum DB
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Total number of hits satisfying chosen parameters:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Searched:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Scoring table:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             OM protein -
      Pred. No. is the number of results predicted by chance to have a score greater than or equal to the score of the result being printed, and is derived by analysis of the total score distribution.
   2614
2499.5
1041.5
1014.5
1016.5
1016.5
1016.5
1016.5
1019.1
1010.1
1009.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005.5
1005
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Score
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             seq
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    protein search, using sw model
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             length: 0
length: 2000000000
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         PIR_78:*
1: pir1:*
2: pir2:*
3: pir3:*
4: pir4:*
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         BLOSUM62
Gapop 10.0 , Gapext 0.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    September 9, 2004, 09:58:38; Search time 28.8797 Seconds (without alignments) 2398.154 Million cell updates/sec
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Query
Match Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            283366 segs, 96191526 residues
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1 MAPSIDSLATTLANGFINGS......RIYEAIKDGRINHVLVKMLA 720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  US-09-939-408A-13
3610
   GenCore version 5.1.6
Copyright (c) 1993 - 2004 Compugen Ltd.
   DВ
   A56628
A29607
S01999
G844787
S52997
S65343
J402265
T4617444
S0144675
S044467
S044467
S044467
S044675
S04475
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
JC5877
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             SUMMARIES
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         283366
                                                                                                                                                                                                                                                                                                                                                                                                                                                      phenylalanine aphenylalanine aphenyl
phenylalanine
phenylalanine
phenylalanine
phenylalanine
phenylalanine
                                                                                                                                                  phenylalanine
phenylalanine
phenylalanine
phenylalanine
phenylalanine
phenylalanine
phenylalanine
phenylalanine
phenylalanine
phenylalanine
phenylalanine
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           phenylalanine
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Description
```

	ALIGNMENTS					
hutH gene	E98245	N	514	15.0	543	45
histidine	AG3040	N	514	15.0	543	44
phenylalanine	JQ1070	N	416	15.1	543.5	43
histidine ammonia	F75610	N	524	15.2	547.5	42
phenylalanine	T05966	N	475	18.2	655.5	41
probable phenylala	T05968	N	497	18.3	659.5	40
phenylalanine	A24727	N	505	19.3	697.5	<u>د</u> 9
phenylalanine	S04129	N	506	19.5	703.5	38
phenylalanine	S60043	N	582	24.3	875.5	37
phenylalanine	S28185	N	716	25.9	934	36
phenylalanine	S52632	N	619	26.2	Ψ	<b>3</b> 5
phenylalanine	S04128	N	710	26.2	946.5	34
phenylalanine	S60042	N	710	26.4		ω S
phenylalanine	S29029	N	707	26.4	954.5	32
phenylalanine	T05970	N	549	26.5	955	31
phenylalanine	852992	N	695	26.7		ω O

γQ	Qy Db	dg Qy	dd Vy	4G 7Q	D Q	B &	Query Match Best Local Matches 52	RESULT 1 A56628 phenylalanin C;Species: R C;Date: 21-J C;Accession: R;Rasmussen, ByAssmussen, ByAstaus: pr A;Accession: A;Accession: A;Accession: A;Accession: A;Accession: A;Accession: A;Accession: A;Accession: A;Accession: A;Accession: A;Accession: A;Accession: A;Accession: A;Accession: A;Accession: A;Accession: A;Cross-refe A;Access-refe A;Access-r
361 EGILRODRYPLRTSPOFLGPLVEDMMHAYSTLSLE-NNTTTDNFLLDVENKQTAHGGNFO 419	301 ALTALTVEAMVGQQGSFAPFIHDVCRPHDGQVEVARNIRTLLSGSSFAVEHEEEVKVKDD 360	241 VLHEGTEKIMFAREAISLFGLEAVVLGPKEGLGLVNGTAVSASMATLSLHDSHMLSLLSQ 300  -       -   -   -   -	181 SLTRGHSAVRLVVLEALTNFLNHRITÞIVÞLRGSISASGDLSÞLSYIAGAITGHÞDVKVH 240 	121 GFGGSADTRTEDAVSLQKALIEHQLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIRVN 180	61 PTDDVVELGGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSVYGVTT 120	1 MAPSLDSLATTLANGFTNGSHAAPTKSAAGPTSALRRTPGLDGHAAHQSQLEIVQELLSD 60        :::  : 	/ Match 72.4%; Score 2614; DB 2; Length 716; Local Similarity 72.0%; Pred. No. 1.3e-165; nes 522; Conservative 86; Mismatches 103; Indels 14; Gaps 5;	RESULT 1  156628  C;Abete: 21-Jul-1995 #sequence_revision 21-Jul-1995 #text_change 16-Jul-1999  C;Accession: A56628  R;Rasmussen, O.F.; Oerum, H.  DNA Seq. 1, 207-211, 1991  A;Title: Analysis of the gene for phenylalanine ammonia-lyase from Rhodosporidium torulo A;Reference number: A56628; MUID:92127061; PMID:1773059  A;Accession: A56628  A;Accession: A56628  A;Accession: A56628  A;Accession: A56628  A;Accession: A56628  A;Accession: A56628  A;Cross-references: GB:X51513; NID:93293, PIDN:CAA35886.1; PID:93294  A;Note: sequence extracted from NCBI backbone (NCBIP:78381)  C;Genetics: C;Superfamily: histidine ammonia-lyase C;Reywordd: ammonia-lyase; carbon-mitrogen lyase F;211-213/Cross-link: 5-imidazolinone (Ala-Gly) #status predicted F;211/Modified site: dehydroalanine (Ser) #status predicted

```
A;Reference number: A29607; MUID:88112870; PMID:2828184
A;Accession: A29607
A;Molecule type: DNA
A;Residues: 1-693 <ANS>
A;Cross-references: GB:M18261; NID:g169745; PIDN:AAA33883.1; PID:g169746
C;Superfamily: histidine ammonia-lyase
C;Keywords: ammonia-lyase; carbon-nitrogen lyase
C;Keywords: ammonia-lyase; carbon-nitrogen lyase
F;188-190/Cross-link: 5-imidazolinone (Ala-Gly) #status predicted
F;189/Modified site: dehydroalanine (Ser) #status predicted
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               phenylalanine ammonia-lyase (EC 4.3.1.5) - fungus (Rhodosporidium toruloides) (straces can be a served as the control of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the care of the c
                       Ş
                                                             망
                                                                                                        Ş
                                                                                                                                                                   В
                                                                                                                                                                                                         Ś
                                                                                                                                                                                                                                                       몽
                                                                                                                                                                                                                                                                                                   Ş
                                                                                                                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                                                                                                  5
                                                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             8 Q
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Дb
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Дb
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Matches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Local Similarity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       540
                                                                          260
                                                                                                                   289
                                                                                                                                                                                                                                                                  140
                                                                                                                                                                                                                    229
                                                                                                                                                                                                                                                                                                                  169
                                                                                                                                                                                                                                                                                                                                                                                                              60T
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              652
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         596
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         535
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          475
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         415
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     355
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    420
                                                                                                                                                                                                                                                                                                                                                                   80
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               49
                                                                                                                                                                                                                                                                                                                                                                                                                                                               20
                                                                                                                                                                                                                                                                                                                                                              SQLSMSVYGVTTGFGGSADTRTEDAISLQKALLEHQLCGVLPSSFDSFRLGRGLENSLPL
                       VEHEEEVKVKDDEGILRODRYPLRTSPOFTGPLVEDWHAYSTLSLE-NNTTTDNPLLDV
                                                                                                   LHDSHMLSILSQALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTILSGSSFA
                                                                                                                                                                                                       GAITGHPDVKVHVLHEGTEKIMFAREAISLFGLEAVVLGPKEGLGLVNGTAVSASMATLS
                                                                                                                                                                                                                                                                    EVVRGAMTIRVNSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIA
                                                                                                                                                                                                                                                                                              EVVRGAMVIRVNSLTRGHSAVRLVVLEALTNFLNHRITPIVPLRGSISASGDLSPLSYIA
                                                                                                                                                                                                                                                                                                                                                                                                              AQLQNSVYGVTTGFGGSADTRTEDAVSLQKALIEHQLCGVTPTSXSSFSVGRGLENTLPL 168
                                                                                                                                                                                                                                                                                                                                                                                                                                                               TQVDIVEKYLAAPTDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLR
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          SQLEIVQELLSDPTDDVVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLK 108
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        LHDAHMLSLLSQSLTAMTVEAMVGHAGSFHFFLHDVTRPHPTQIEVAGNIRKLLEGSRFA
                                                                                                                                                                        AAISGHPDSKVHVVHEGKEKILYAREAMALFNLEPVVLGPKEGLGLVNGTAVSASMATLA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              VKMLA 720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       PRWHDAFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAISLTREVRNRFWQTPSSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        AAYTSELGHLANPVTTHVQPAEMANQAVNSLALISARRTTESNDVLSLLLATHLYCVLQA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   AAYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                BGILRQDRYPLRTSPQWLGPLVSDLIHAHAVLTIEAGQSTTDNPLIDVENKTSHHGGNFQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          PRWHDAFSFAAGTVVEVLSST---SLSLAAVNAWKVAAAESAISLTRQVRETFWSAASTS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    AAAVANTMEKTRLGLAQIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  ASAVSISMEKTRLALALIGKLNFTQCTELLNAAMNRGLPSCLAAEDPSLNYHGKGLDIHI
Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    71.3%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             83,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Score 2573; DB 2;
Pred. No. 6.5e-163;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Mismatches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Length 693;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Gaps
                                                                                                                   348
                                                                                                                                                                                                                                                                                                                                                                139
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            715
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    479
                                                                       319
                                                                                                                                                                                                                                                                  199
                            407
                                                                                                                                                                        259
                                                                                                                                                                                                                    288
                                                                                                                                                                                                                                                                                                                  228
                                                                                                                                                                                                                                                                                                                                                                                                                                                               79
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        651
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         655
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         594
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        534
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   539
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 711
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  414
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          (strain
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              for
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 A;Cross-references: EMBL:X13095
C;Genetics:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   phenylalanine ammonia-lyase (EC 4.3.1.5) - fungus (Rhodotorula rubra) C;Species: Rhodotorula rubra C;Species: Rhodotorula rubra C;Species: Rhodotorula rubra C;Species: Sospina B #sequence revision 30-Sep-1989 #text_change 16-Jul-1999 C;Accession: S01999; S01990 R;Filpula, D; Vaslet, C.A.; Levy, A.; Sykes, A.; Strausberg, R.L. Nucleic Acids Res. 16, 11381, 1988 Nucleic Acids Res. 16, 11381, 1988 A;Title: Nucleotide sequence of gene for phenylalanine ammonia-lyase from RP A;Reference number: S01999; MUID:89083582; PMID:3205749
                            유
                                                                                                                B
                                                                                                                                                              Ş
                                                                                                                                                                                                                    망
                                                                                                                                                                                                                                                                                                                                                                                                                                   A;Introns: 110/2; 139/2; 372/3; 428/2; 482/3 c;Superfamily: histidine ammonia-lyase C;Keywords: ammonia-lyase; carbon-nitrogen lyase F;217-219/Cross-link: 5-imidazolinone (Ala-Gly) #
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               A;Status: translation not shown A;Molecule type: mRNA A;Residues: 1-674 <VAS>
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    A;Cross-references: EMBL:X13094; NID:g3284; PIDN:CAA31486.1; PIR;Vaslet, C.A.; Strausberg, R.L.; Sykes, A.; Levy, A.; Filpula, Nucletc Acids Res. 16, 11382, 1988
A;Title: cDNA and genomic cloning of yeast phenylalanine ammoni A;Reference number: S01990; MUID:89083583; PMID:3205750
A;Accession: S01990
                                                                                                                                                                                                                                                     Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 A; Molecule type: DNA
A; Residues: 1-713 <FIL>
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    A; Accession: S01999
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              덩
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                                                                                            ;218/Modified site: dehydroalanine (Ser) #status predicted
                                                                                                                                                                                                                                                                                                                     Matches
                                                                                                                                                                                                                                                                                                                                         Local
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                500
                            113
                                                                       113
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  704
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   617
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 644
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               560
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                584
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              528
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               440
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             468
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             380
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         320
                                                                                                                     53
                                                                                                                                                                   54
                                                                                                                                                                                                                                                                                                                  511;
                                                                                                                                                                                                                                                               ,_
                                                                                                                                                                                                                                                                                                                                         Similarity
                         NSVYGVTTGFGGSADTRTEDAVSLQKALIEHQLCGVTFTSXSSFSVGRGLENTLPLEVVR
                                                                                                                                                                                                                                                                  MAPSIDSLATTIANGFTNGSHAAPT-----KSAAGPTSALRRTPGIDGHAAHQSQLEI
                                                                                                                        VERILADAGATDQIKLDGYTLTLGDVVGAARRGRSVKVADSPHIREKIDASVEFLRTQLD
                                                                                                                                                                   VQELLSDP-TDDVVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQ
                                                                                                                                                                                                                    MAPSVDSTATSVANSLSNGLHAAAAANGGDVHKKTAGAGSLLPTT-----ETTQLDT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  EAIKDGRINHVLVKMLA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     KRLEQTNSYDLVPRWHDAFSFAAGTVVEVLSST---
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              LLASHLYCTLQAVDLRAMELDFKKQFDPLLPTLLQQHLG---TGLDV-NALALEVKKALN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           LNYHGKGLDIHIAAYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         EAIKSGRINNVLLKMLA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  VRNRFWQTPSSQAPAHAYLSPRTRVLYSFVREELGVQARRGDVFVGVQQETIGSNVSRIY
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                KRIEOTTTYDLEPRWHDAFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAISLTRE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              LLATHLYCVLQAIDLRAIEFEFKKQFGPAIVSLIDQHFGSAMTGSNLRDELVEKVNKTLA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            LSYHCKGLDIAAAAYTSELGHLANPVTTHVQPAEMANQAVNSLALISARRTTESNDVLSL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        ENKTSHHGGNFQAAAVANTMEKTRLGLAQIGKLNFTQLTEMLNAGMNRGLFSCLAAEDPS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   VRETEWSAASTSSPALSYLSPRIQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIY
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      ENKQTAHGGNFQASAVSISMEKTRLALALIGKLNFTQCTELLNAAMNRGLPSCLAAEDPS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       VHHEEEVKVKDDEGILRODRYPLRTSPOWLGPLVSDLIHAHAVLTIEAGOSTTDNPLIDV
                                                                                                                                                                                                                                                                                                                     Conservative
                                                                                                                                                                                                                                                                                                                                       69.2%;
                                                                                                                                                                                                                                                                                                                  83;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  720
                                                                                                                                                                                                                                                                                                                Score 2499.5; DB 2
Pred. No. 5.2e-158;
3; Mismatches 105;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                phenylalanine ammonia-lyase genes reveal PMID:3205750
                                                                                                                                                                                                                                                                                                                                                                                                                                     #status predicted
                                                                                                                                                                                                                                                                                                                                                                DB 2;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            SLSLAAVNAWKVAAAESAISLTRQ
                                                                                                                                                                                                                                                                                                                                                                Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           PID:g295942
la, D.
                                                                                                                                                                                                                                                                                                                     35;
                                                                                                                                                                                                                                                                                                                  Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       from Rhodotorula
                                                                          172
                                                                                                                        112
                                                                                                                                                                        112
                                                                                                                                                                                                                    52
                                 172
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               616
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                643
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 583
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             527
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             439
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     676
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   703
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                559
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               499
```

```
A;Status: pro-
A;Molecule type: DNA
A;Residues: 1-725 <STO>
A;Residues: GB;AE002093; NID:g6598547;
                                                                                                                                                                                                                                                                                                                              phenylalanine ammonia lyase (PALI) [imported] - Arabidopsis thaliana (Species: Arabidopsis thaliana (Mouse-ear cress) (Species: Arabidopsis thaliana (Mouse-ear cress) (C;Date: 02-Feb-2001 #sequence_revision 02-Feb-2001 #text_change 16-Feb-2001 (C;Accession: G84787 (Rounsley, S.D.; Shea, T.P.; Benito, M.I.; Town, C.D.; Fujii, C.Y. R;Lin, X.; Kaul, S.; Rounsley, S.D.; Shea, T.P.; Benito, M.I.; Town, C.D.; Fujii, C.Y. M.; Xoo, H.; Moffat, K.S.; Cromin, L.A.; Shen, M.; VanAken, S.E.; Umayam, L.; Tallon, euss, D.; Nierman, W.C.; White, O.; Eisen, J.A.; Salzberg, S.L.; Fraser, C.M.; Venter, Mature 402, 761-768, 1999
                                                                                                                                                                    A;Gene
A;Map
C;Supe
                                                                                                                                                                                                                                                                                    A; Reference number: A84420; A; Accession: G84787
                                                                                                                                                                                                                                                                                                    A; Title: Sequence and analysis of chromosome 2 of the plant Arabidopsis thaliana. A; Reference number: A84420; MUID:20083487; PMID:10617197
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           멂
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  g
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Db.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            В
              Ş
                                            밁
                                                                        Ş
                                                                                                                                                                                                                                                                     A;Status: preliminary
                                                                                                      Query Match
Best Local Sim
Matches 272;
                                                                                                                                                                   ;Superfamily: histidine ammonia-lyase
                                                                                                                                                                                            Gene: At2g37040
                                                                                                                                                                               position:
                                                                                                                      Local Similarity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    700
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              707
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             640
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       647
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  587
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                529
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             532
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         469
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       472
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     409
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                412
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                349
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           353
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       289
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     293
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   233
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         173
                 13
                                                                          18
           PTDDVVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSV--YGV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               GHPDSKVHV--DG--KIMSAQEAIALKGLQPVVLGPKEGLGLVNGTAVSASMATLALTDA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GAMVIRVNSLTRGHSAVRLVVLEALTNFLNHRITPIVPLRGSISASGDLSPLSYIAGAIT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           RFWQTPSSQAPAHAYLSPRTRVLYSFVREELGVQARRGDVFVGVQQETIGSNVSRIYEAI 706
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 GKGLDIHIAAYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLAS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             TEVKVKDDEGILRQDRYPLRCSPQWLGPLVSDMIHAHAVLSLEAGQSTTDNPLIDLENKM
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         HMLSLLSQALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHE
                                               NGAH----KSNGGGVDAMLCGGDIKTKNMVINAEDPLNWGAAAEQMKGSHLDEVKRMVAE
                                                                          KSGCIAPVLVKMMA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             KDGRINHVLVKMLA 720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           SFWAAPSSSSPALKYLSPRTRVLYSFVREEVGVKARRGDVYLGKQEVTIGTNVSRIYEAI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      QQNNSYDLEQRWHDTFSVATGAVVEALAGQ----EVSLASLNAWKVACAEKAIALTRSVRD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                EQTTTYDLEPRWHDAFSYATGTYVELLSSSPSANVTLTAVNAWKVASAEKAISLTREVRN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                HLYCVLQAVDLRAMEFEHTKAFEPMVTELLKQHFG-----ALATAEVEDKVRKSIYKRL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         HLYCTLQAVDLRAMELDFKKQFDPLLPTLLQQHLGTGLDVNALAL-----EVKKALNKRL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CKGLDIAAAAYTSELGHLANPVSTHVQPAEMGNQAINSLALISARRTAEANDVLSLLLAT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     THHGGAFMASSVGNTMEKTRLAVALMGKVSFTQLTEMLNAGMNRALPSCLAAEDPSLSYH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  TAHGGNFQASAVSISMEKTRLALIALIGKLNFTQCTELLNAAMNRGLPSCLAAEDPSLNYH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         EEVKVKDDEGILRODRYPLRTSPOFLGPLVEDMMHAYSTLSLE-NNTTTDNPLLDVENKO
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         HVLSLLAQALTALTVEAMVGHAGSFHPFLHDVTRPHPTQIEVARNIRTLLEGSKYAVHHE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             GHPDVKVHVLHEGTEKIMFAREAISLFGLEAVVLGPKEGLGLVNGTAVSASMATLSLHDS
                                                                                                        Conservative 138; Mismatches 258;
28.9%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    713
                                                                                                                      Score 1041.5; DB 2;
Pred. No. 3.7e-61;
                                                                                                                                                                                                                           PIDN: AAD18156.2;
 = -
                                                                                                        Indels
                                                                                                                                   Length
                                                                                                                                                                                                                             GSPDB:GN00139
                                                                                                        77;
                                                                                                        Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           411
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     468
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              232
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  646
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       531
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  471
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   288
                  118
                                               59
                                                                           60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             699
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       639
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                582
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              586
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           528
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         348
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              292
                                                                                                                                                                                                                                                                                                                                                                C.Y.;
                                                                                                                                                                                                                                                                                                                                                                RESULT
S52990
                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                망
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           맑
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         문
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       占
                                                            A; Molecule type: DNA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     356
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       173
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              119
                                                                                                                                                                                                                                                                                                                                                                                                                             690
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             589
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           527
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    467
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                475
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              407
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         347
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                296
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            233
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    639
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          9
                                                                                                                                                                                                                                                                                                                                                                                                                             PGEEFDKVFTAICEGKIIDPMMECL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                VYTYADDP
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         FRKPVVNLGGETLTIGQVAAISTIGNSVKVELSETARAGVNASSDWVMESMNKGTDSYGV
                                                                                                                                                                                                                                                                                                                                                                                                                                                         IGSNVSRIYEAIKDGRINHVLVKML
                                                                                                                                                                                                                                                                                                                                                                                                                              714
```

```
phenylalanine ammonia-lyase (EC 4.3.1.5) 1 - Arabidopsis thaliana (PSpecies: Arabidopsis thaliana (mouse-ear cress) (C)Species: Arabidopsis thaliana (mouse-ear cress) (C)Date: 14-Unl-1995 #sequence revision 21-Unl-1995 #text_change 16-Unl-1999 (C)Accession: S52990, PQ0140 Rywanner, L.A.; Li, G.; Ware, D.; Somssich, I.E.; Davis, K.R. Plant Mol. Biol. 27, 327-338, 1995 A;Title: The phenylalanine ammonia-lyase gene family in Arabidopsis thaliana A;Reference number: S52990, MUID:95195160; PMID:7888652 A;Accession: S52990
A;Residues: 1-240 <OHL>
A;Residues: 1-240 <OHL>
A;Cross-references: GB:X62747; NID:g16408; PIDN:CAA44609.1; PID:g16409
A;Experimental source: Ecotype Columbia
C;Comment: Phenylalanine ammonia-lyase catalyzes the deamination of L-
                                                                                                                                                                                                                                                                                                    A,Title: Functional properties of a phenylalanine ammonia-lyase A,Reference number: PQ0140; MUID:93005677; PMID:2152131 A;Accession: PQ0140
                                                                                                                                                                                                                                                                                                                                                                                                                                                                             A;Cross-references: EMBL:L33677; NID:g497418; PIDN:AAC18870.1; A;Note: the nucleotide sequence was submitted to the EMBL Data R;Ohl, S.; Hedrick, S.A.; Chory, J.; Lamb, C.J. Plant Cell 2, 837-848, 1990
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              A;Status: nucleic acid sequence not shown; translation not A;Molecule type: DNA A;Residues: 1-725 <WAND
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          S--LTREVR--NRFWQTPSSQAPAHAYLSPRTRVLYSFVREELGVQARRGDVFVGVQQET
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  LDIHIAAYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLY
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       A----TGPNGEALTÁBEAFKLAGISSGFFDLQPKEGLALVNGTAVGSGMASMVLFETNVL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 VNSLTRGHSAVRLVVLEALTNFLNHRITPIVPLRGSISASGDLSPLSYIAGAITGHPDVK
:|:| :| | :| | :| | :| | :| | : | | : | | : | | : | | : | | : | | | : | | : | | : | | : | | : | | : | | : | | : | | : | | : | | : | | : | | : | | : | | : | | : | | : | | : | | : | | : | | : | | : | | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | :
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     KAVLPKEVEAARAAYDNGTSAIP-NRIKECRSYPLYRFVREELGT-----ELLTGEKVTS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     TTTYDLEPRWHDAFSYATGTVVE------LLSSSPSANVTLTAVNAWKVASAEKAI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          AICQAVDLRHLEENLRQTVKNTVSQVAKKVLTTG--VNG-ELHPSRFCEKDLLKVVDREQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          AEIAMASYCSELQYLANPVTSHVQSAEQHNQDVNSLGLISSRKTSEAVDILKLMSTTFLV 526
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           GNFQGTPIGVSMDNTRLAIAAIGKLMFAQFSELVNDFYNNGLPSNLTASRNPSLDYGFKG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     HEMDPLQKPKQDRYALRTSPQWLGPQIEVIRYATKSIEREINSVNDNPLIDVSRNKAIHG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 KVKDDEGILRODRYPLRTSPOFLGPLVEDMMHAYSTLSLENNTTTDNPLLDVENKOTAHG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      SVLAETLSAVFAEVMSGKP-EFTDHLTHRLKHHPGQIEAAAIMEHTLDGSSY-MKLAQKL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           SLISQALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            VHVLHEGTE-KIMFAREAISURGLEA--VVLGPKEGLGLVNGTAVSASMATLSLHDSHML
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  TTGFGATSHRRTKNGVALQKELIRFLNAGI-----FGSTKETSHTLPHSATRAAMLVR
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       TTGFGGSADTRTEDAVSLOKALIEHOLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIR
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CTLQAVDLRAMELDFKKQFDPLLPTLLQQHLGTGLDVNALALEVKKALNKRL-----EQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          GNFQASAVSISMEKTRLALALIGKLNFTQCTELLNAAMNRGLPSCL-AAEDPSLNYHGKG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               --CSATYPLIQKLRQVIVDHALINGESEKNAVTSIFH--KIGAFÉEEL
             catalyzes the deamination of L-phenylalanine
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             PID:g497419
Library, June
                                                                                                                                                                                                                                                                                                                                                                                                                                             promoter from
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            588
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        355
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             238
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       474
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  406
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       415
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   346
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             288
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              232
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               172
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            689
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 694
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      635
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  638
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            534
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  466
                                                                                                                                                                                                                                                                                                                                                                                                                                                   Arabidopsi
```

ç d

```
RESULT 6
S48726
phenylalanine ammonia-lyase (EC 4.3.1.5)
C;Species: Petroselinum crispum (parsley)
C;Date: 18-Oct-1995 #sequence revision 12
C;Accession: S48726; S56035
R;Appert, C:; Logemann, E:; Hahlbrock, K.
Eur. J. Biochem. 225, 491-499, 1994
                                                                                                                               В
                                                                                                                                                                                                                                                                                                               성 암
                                                                                                                                                                                                                                                                                                                                                           정
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             ከ ፈ ፈ ひ ひ  
                                                                                                                                                                                                                                                                                                                                                                                                       Š
                                                                                                                                                                                                                                                                                                                                                                                                                                    왕
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           유정
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                뮹
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              ;Genetics:
.;Gene: PALI
;;Introns: 143/2
;;Introns: histidine ammonia-lyase
;Keywords: ammonia-lyase; carbon-nitrogen lyase
;Keywords: ammonia-lyase; carbon-nitrogen lyase
;7211-013/Cross-link: 5-imidazolinone (Ala-Gly) #status predicted
;7212/Modified site: dehydroalanine (Ser) #status predicted
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Query Match
Best Local S
Matches 271
                                                                                                                  690
                                                                                                                                        695
                                                                                                                                                            636
                                                                                                                                                                                  639
                                                                                                                                                                                                          584
                                                                                                                                                                                                                              589
                                                                                                                                                                                                                                                    527
                                                                                                                                                                                                                                                                           535
                                                                                                                                                                                                                                                                                                467
                                                                                                                                                                                                                                                                                                                       475
                                                                                                                                                                                                                                                                                                                                             407
                                                                                                                                                                                                                                                                                                                                                                   416
                                                                                                                                                                                                                                                                                                                                                                                       347
                                                                                                                                                                                                                                                                                                                                                                                                              356
                                                                                                                                                                                                                                                                                                                                                                                                                                     289
                                                                                                                                                                                                                                                                                                                                                                                                                                                          296
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                233
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       239
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              173
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  179
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         120
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               119
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               271;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        18
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 4
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Similarity
                                                                                                                  PGEEFDKVFTAICEGKIIDPMMECL
                                                                                                                                                           KAVLPKEVEAARAAYDNGTSAIP-NRIKECRSYPLYRFVREELGT----
                                                                                                                                                                                  S---LTREVR---NRFWQTPSSQAPAHAYLSPRTRVLYSFVREELGVQARRGDVFVGVQQET
                                                                                                                                                                                                         VYTYADDP
                                                                                                                                                                                                                             TTTYDLEPRWHDAFSYATGTVVE------LLSSSPSANVTLTAVNAWKVASAEKAI
                                                                                                                                                                                                                                                    AICQAVDLRHLEENLRQTVKNTVSQVAKKVLTTG--VNG-ELHPSRFCEKDLLKVVDREQ
                                                                                                                                                                                                                                                                        CTLQAVDLRAMELDFKKQFDPLLPTLLQQHLGTGLDVNALALEVKKALNKRL----
                                                                                                                                                                                                                                                                                                            LDIHIAAYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLY
                                                                                                                                                                                                                                                                                                                                           GNFQGTPIGVSMDNTRLAIRAIGKLMFAQFSELVNDFYNNGLPSNLTAGRNPSLDYGFKG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        VNSLTRGHSAVRLVVLEALINFLNHRITPIVPLRGSISASGDLSPLSYIAGAITGHPDVK
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     TTGFGGSADTRTEDAVSLQKALIEHQLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIR
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        PTDDVVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSV--YGV
                                                                                                                                      IGSNVSRIYEAI KDGRINHVLVKML
                                                                                                                                                                                                                                                                                               AEIAMASYCSELQYLANPVTSHVQSAEQHNQDVNSLGLISSRKTSEAVDILKLMSTTFLV
                                                                                                                                                                                                                                                                                                                                                                GNFQASAVSISMEKTRLALIALIGKLNFTQCTELLNAAMNRGLPSCL-AAEDPSLNYHGKG
                                                                                                                                                                                                                                                                                                                                                                                       HEMDPLQKPKQDRYALRTSPQWLGPQIEVIRYATKSIEREINSVNDNPLIDVSRNKAIHG
                                                                                                                                                                                                                                                                                                                                                                                                             KVKDDEGILRODRYPLRTSPQFLGPLVEDMMHAYSTLSLENNTTTDNPLLDVENKQTAHG
                                                                                                                                                                                                                                                                                                                                                                                                                                     SVLAEILSAVFAEVMSGKP-EFTDHLTHRLKHHPGQIEAAAVMEHILDGSSY-MKLAQKL
                                                                                                                                                                                                                                                                                                                                                                                                                                                        SLLSQALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                               A----TGPNGEALTAEEAFKLAGISSGFFDLQPKEGLALVNGTAVGSGMASMVLFETNVL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           INTLLQGFSGIRFEILEAITSFLNNNITPSLPLRGTITASGDLVPLSYIAGLLTGRPNSK
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        TTGFGATSHRRTKNGVALQKELIRFLNAGI-----FGSTKETSHTLPHSATRAAMLVR
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   FRKPVVNLGGETLTIGQVAAISTIGNSVKVELSETARAGVNASSDWVMESMNKGTDSYGV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 NGAH----KSNGGGVDAMLCGGDIKTKNMVINAEDPLNWGAAAEQMKGSHLDEVKRMVAE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       NGSHAAPTKSAAGPTSAL-------RRTPGLDGHAAHQ---SQLEIVQELLSD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     VHVLHEGTE-KIMFAREAISLFGLEA--VVLGPKEGLGLVNGTAVSASMATLSLHDSHML
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            28.7%; Score 1035.5; DB 2; ilarity 36.4%; Pred. No. 9.2e-61; Conservative 138; Mismatches 259;
             E.; Hahlbrock, K.;
                                                                                                                                                                                                         CSATYPLIQKLRQVIVDHALVNGESEKNAVTSIFH--KIGAFEEEL
                                              4.3.1.5) 3 -
(parsley)
                               12-Apr-1996 #text_change
                                                                                                                  714
              Schmid, J.;
                                                       parsley
             Amrhein,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Length
              z
                                  16-Jul-1999
                                                                                                                                                            -ELLTGEKVTS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              77;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Gaps
                                                                                                                                                                                                                                                                           ġ
                                                                                                                                                                                                                             638
                                                                                                                                                                                  694
                                                                                                                                                                                                         635
                                                                                                                                                                                                                                                    583
                                                                                                                                                                                                                                                                           588
                                                                                                                                                                                                                                                                                               526
                                                                                                                                                                                                                                                                                                                     534
                                                                                                                                                                                                                                                                                                                                            466
                                                                                                                                                                                                                                                                                                                                                                   474
                                                                                                                                                                                                                                                                                                                                                                                       406
                                                                                                                                                                                                                                                                                                                                                                                                              415
                                                                                                                                                                                                                                                                                                                                                                                                                                     346
                                                                                                                                                                                                                                                                                                                                                                                                                                                         355
                                                                                                                                                                                                                                                                                                                                                                                                                                                                               288
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      295
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             232
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 238
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        172
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              178
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     119
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 59
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              21
             유
                                                      밁
                                                                        5
                                                                                                                    Ş
                                                                                                                                              밁
                                                                                                                                                                Ş
                                                                                                                                                                                           뫄
                                                                                                                                                                                                             8
                                                                                                                                                                                                                                                       Ś
                                                                                                                                                                                                                                                                                                                                                                                             Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          a a C C b C b
                                                                                               뮍
                                                                                                                                                                                                                                       8
                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                    Ś
                                                                                                                                                                                                                                                                                                                          В
                                                                                                                                                                                                                                                                                                                                                 Š
                                                                                                                                                                                                                                                                                                                                                                            밁
                                                                                                                                                                                                                                                                                                                                                                                                                        멍
                                                                                                                                                                                                                                                                                                                                                                                                                                             Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                   В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Query Match
Best Local S
Matches 269
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         ;205/Modified
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Gene: PAL3
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Genetics:
                                  644
                                                         583
                                                                                                   526
                                                                                                                          541
                                                                                                                                                466
                                                                                                                                                                                            406
                                                                                                                                                                                                                                         346
                                                                                                                                                                                                                                                                                                                                                                            171
                                                                                                                                                                      481
                                                                                                                                                                                                                  422
                                                                                                                                                                                                                                                               362
                                                                                                                                                                                                                                                                                      288
                                                                                                                                                                                                                                                                                                           302
                                                                                                                                                                                                                                                                                                                                228
                                                                                                                                                                                                                                                                                                                                                       244
                                                                                                                                                                                                                                                                                                                                                                                                  184
                                                                                                                                                                                                                                                                                                                                                                                                                         120
                                                                                                                                                                                                                                                                                                                                                                                                                                              127
                                                                                                                                                                                                                                                                                                                                                                                                                                                                    60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           70
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        14
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ഗ
             VETARAALESGNPAIPNRIKECKSYPLYKFVREELGT---
                                 VRN-RFWQTPSSQAPAHAYLSPRTRVLYSFVREELGVQARRGDVFVGVQQETIGSNVSRI
```

```
A;Title: Structural and catalytic prope:
A;Reference number: S48725; MUID:950101:
A;Accession: S48726
A;Status: nucleic acid sequence not show the state of the sequence of show the sequence of show the sequence of show the sequence of show the sequence of show the sequence of show the sequence of show the sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of sequence of
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Superfamily: histidine ammonia-lyase; Keywords: ammonia-lyase; Carbon-nitrogen lyase; 204-206/Cross-link: 5-imidazolinone (Ala-Gly)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Similarity
                                                                                                                                                                                                                                                                                                                  GPTGVTLSPEEAFKLAGVEGGFFELQPKEGLALVNGTAVGSGMASMVLFEANILAVLAEV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      EGTEKIMFAREAISLFGLEA--VVLGPKEGLGLVNGTAVSASMATLSLHDSHMLSLLSQA
                                                                                                                                                           DIRHLEENLKSTVKNTVSQVAKRVLTMG--VNG-ELHPSRFCEKDLLRVVDREYIFAYID
                                                                                                                                                                                                                                       DLRAMELDFKKQFDPLLPTLLQQHLGTGLDVNALALEVKKALNKRLEQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  PIGVSMDNTRLAIAAIGKLMFAQFSELVNDFYNNGLPSNLSGGRNPSLDYGFKGAEIAMA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         AVSISMEKTRIALALIGKINFTOCTELLNAAMNRGIPSCLA-AEDPSINYHGKGIDIHIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             QKPKQDRYALRTSPQWLGPQIEVIRSSTKMIEREINSVNDNPLIDVSRNKAIHGGNFQGS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GILRODRYPLRTSPOFLGPLVEDMMHAYSTLSLENNTTTDNPLLDVENKQTAHGGNFQAS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    MSAIFAEVMOGKP-EFTDHLTHKLKHHPGQIEAAAIMEHILDGSAY-VKAAQKLHEMDPL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          LTALITVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEVKVKDDS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   RCHSAVRLVVLEALTNFLNHRITPIVPLRGSISASGDLSPLSYIAGAITGHPDVKVHVLH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          HRTKQGGALQKELIRFLNAGI------FGSGAEAGNNTLPHSATRAAMLVRINTLL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          DTRTEDAVSLOKALIEHOLCGVTPTSXSSFSVGRGLE---NTLPLEVVRGAMVIRVNSLT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          GETLITISQVAAISARDDSGVKVELSEEARAGVKASSDWVMDSMNKGTDSYGVTTGFGATS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GYSLTVRDVVG-AARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSV--YGVTTGFGGSA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            NGFTNGSHAAPTKSAAGPTSALRRTP----GLDGHAAHQSQLEIVQELLSDPTDDVVELS
                                                                           ---TTTYDLEPRWHDAFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAIS--LTRE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     NGTTNG-HA----NGNGLDLCMKKEDPLNWGVAAEALTGSHLDEVKRMVAEYRKPVVKLG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   site: dehydroalanine (Ser) #status
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    and catalytic properties of the four phenylalanine ammonia-lyase S48725; MUID:95010141; PMID:7925471
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              28.2%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Score 1017.5;
Pred. No. 1.4e-
8; Mismatches
-TLVEHALNNGDKERNLSTSIFQKIAAFEDELKALLPKE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            August
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          : g535007;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               PIDN: CAA57057.1;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  #status
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    DB 2;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            275;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           status predicted predicted
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        718;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      PID:g535008
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            95
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Gaps
                                                                                                                                                                                                                                                                                                                      525
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          183
    635
                                                                                                                                                           582
                                                                                                                                                                                                                                       588
                                                                                                                                                                                                                                                                                                                                                                                              540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                              465
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             405
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     421
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    345
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       287
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              243
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  170
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     126
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     59
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 69
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   227
```

EYLTGEKVRSPGEEFEKV

```
C;Keywords: ammonia-lyase; carbon-nitrogen lyase F;201-203/Cross-link: 5-imidazolinone (Ala-Gly) \#status predicted F;202/Modified site: dehydroalanine (Ser) \#status predicted
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      R;Fukasawa-Akada, T.; Kung, S.; Watson, J.C.
Plant Mol. Biol. 30, 711-722, 1996
A;Title: Phenylalanine ammoniayase gene structure, expression, A;Reference number: S66343, MUID:96194455, PMID:8624404
A;Accession: S66343
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  phenylalanine ammonia-lyase (EC 4.3.1.5) 1 - common tobacco C;Species: Nicotiana tabacum (common tobacco) C;Date: 19-Mar-1997 #sequence_revision 25-Apr-1997 #text_cheC;Accession: S66343
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  A; Introns: 133/2
C; Superfamily: h
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                A;Cross-references: EMBL:M84466; NID:g170349; PIDN:AAA34122.1; PID:g170350
C;Genetics:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Š
                                                                                                                                                                                                                                                                                                                                                                                            망
                                                                                                                                                                                                                                                                                                                                                                                                                                      Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              A;Gene: PAL1
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            A; Molecule type: DNA
A; Residues: 1-715 < FUK>
                                                                            Ş
                                                                                                                            밁
                                                                                                                                                               δ
                                                                                                                                                                                                               멍
                                                                                                                                                                                                                                                      Š
                                                                                                                                                                                                                                                                                                       B
                                                                                                                                                                                                                                                                                                                                         5
                                밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Query Match
Best Local Similarity
Matches 270; Conserv
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Superfamily: histidine ammonia-lyase
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Status: preliminary;
                                                                                                                                                                                                                                                                                                                                                                                                                                        305
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         171
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 691
                                                                                                                                                                                                                                                                                                         346
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    229
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      703
                                                                                                                                                                        484
                                                                                                                                                                                                                    406
                                                                                                                                                                                                                                                                                                                                                     365
                                                                                                                                                                                                                                                                                                                                                                                                 288
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           72
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                13
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    w
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             SLIVRDVVGAA---RKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSV--YGVTTGFGGSA 126
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       SNGHVNGGENFELCKKSADPLNWEMAAESLRG----SHLDEVKKMVSEFRKPMVKLGGE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                ANGETN-GSHAAPTKSAAGPTSALRRTPGLDGHAAHQSQLEIVQELLSDPTDDVVELSGY
                                                                                     AMELDFKKQFDPLLPTLLQQHLGTGLDVNALALEVKKALNKRLEQTTTYDLEPRWHDA--
                                                                                                                                                            SELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQAVDLR
                                                                                                                                                                                                                    VSMDNARLALASIGKLMFAQFSELVNDYYNNGLPSNLTASRNPSLDYGFKGAEIAMASYC
                                                                                                                                                                                                                                                           ISMEKTRIALALIGKINFTQCTELINAAMNRGLPSCL-AAEDPSLNYHGKGLDIHIAAYA 483
                                                                                                                                                                                                                                                                                                                                                     RODRYPLRTSPOFLGPLVEDMMHAYSTLSLENNTTTDNPLLDVENKOTAHGGNFOASAVS
                                                                                                                                                                                                                                                                                                                                                                                                 IFAEVMNGKP-EFTDHLTHKLKHHPGQIEAAAIMEHILDGSSY-VKAAQKLHEMDPLQKP
                                                                                                                                                                                                                                                                                                                                                                                                                                        LTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEVKVKDDEGIL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    - ETLNAEEAFRVAGVNGGFFELQPKEGLALVNGTAVGSGMASMVLFDSNI LAVMSEVLSA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           EKIMFAREAISLFGLEA--VVLGPKEGLGLVNGTAVSASMATLSLHDSHMLSLLSQALTA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         SGIRFEILEAITKLINSNITPCLPLRGTITASGDLVPLSYIAGLLTGRPNSKA-VGPNG-
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              SAVRLVVLEALTNELNHRITPIVPLRGSISASGDLSPLSYIAGAITGHPDVKVHVLHEGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              HRRTKNGGALOKELIRFLNAGV-----FGNGTETSHTLPHSATRAAMLVRINTLLQGY 170
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   DTRTEDAVSLOKALIEHQLCGVTFTSXSSFSVGRGLENTLPLEVVRGAMVIRVNSLTRGH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 SLTVAQVAAIAVRDKSANGVKVELSEEARAGVKASSDWVMDSMNKGTDSYGVTTGFGATS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               FTAMSKĠEİIDPLLECL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      YEAIKDGRINHVLVKML
                                         HLEENLK----
                                                                                                                                                                                                                                                                                                         KQDRYALRTSPQWLGPQIEVIRAATKMIEREINSVNDNPLIDVSRNKALHGGNFQGTPIG
                                                                                                                                 SELOFLANPVINHVOSAEQHNODVNSLGLISARKTAEAVDILKLMSSTYLVALCOAIDLR
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          28.2%; Score 1016.5; DB 2; Length llarity 36.0%; Pred. No. 1.6e-59; Conservative 130; Mismatches 259; Indels
-FSYATG-
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 707
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         25-Apr-1997 #text_change 16-Jul-1999
                                         -NA----VKNTVSQVAKRTLTMGANGELHPARF
-TVVELLSSSPSANVTLTAVNAWKVAS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Length 715;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              91;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         and evolution
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Gaps
  633
                                                                                     601
                                                                                                                                 525
                                                                                                                                                                            543
                                                                                                                                                                                                                      465
                                                                                                                                                                                                                                                                                                           405
                                                                                                                                                                                                                                                                                                                                                       424
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                304
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        186
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           57
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         ä
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Nicoti
```

```
phenylalanine ammonia-lyase (EC 4.3.1.5) - western balsam poplar x cottonwood (;Species: Populus trichocarpa x Populus deltoides (western balsam poplar x cottonwood) (;Date: 30-Sep-1993 #sequence_revision 20-Aug-1994 #text_change 28-May-1999 (;Accession: JQ2265 R;Subramaniam, R.; Reinold, S.; Molitor, E.K.; Douglas, C.J. Plant Physiol. 102, 71-83, 1993 A;Title: Structure, inheritance, and expression of hybrid poplar (Populus trichocarpa x A;Reference number: JQ2265; MUID:94151434; PMID:8108506 A;Accession: JQ2265
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    A;Cross-references: GB:L11747; NID:g169453; PIDN:AAA33805.1; PID:g169454
A;Note: the authors translated the codon AgG for residue 331 as GLu and AAG for residue C;Comment: The enzyme plays a role in linking primary metabolism to phenylpropanoid meta C;Superfamily: histidine ammonia-lyase C;Keywords: ammonia-lyase oarbon-nitrogen lyase F;201-203/Cross-link: 5-inidazolinone (Ala-Gly) #status predicted F;202/Modified site: dehydroalanine (Ser) #status predicted
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    A; Molecule type: mRNA
A; Residues: 1-715 < SUB>
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ś
                                                                                                                                                                                                                       Ş
                                                                                                                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                                                                                                          Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                문
                               Ş
                                                                                       뮹
                                                                                                                                S
                                                                                                                                                                                맑
                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Best Loc
Matches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Query Match
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   œ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Local Sim
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              621
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       634
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     561
                                                                                                                                                                                  343
                                                                                                                                                                                                                              357
                                                                                                                                                                                                                                                                                                                       301
                                                                                                                                                                                                                                                                                                                                                                                                                                                            167
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        183
                                                                                                                                                                                                                                                                                                                                                                   224 TGPTGEVLDAAEAFKAAGIESGFFELOPKEGLALVNGTAVGSGLASMVLFETNVLAVLSE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 125
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           68
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               و
1
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      \vdash
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    ω
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Similarity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               AE---KAISLTREVRN-REWQTPSSQAPAHAYLSPRTRVLYSFVREELGVQARRGDVFVG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       EKVRSPGEECDKVFTAMCNGQIIDPMLECL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  FEDELKAV-LPKEVESARAALESGNPAIPNRITECKSYPLYRFVRKELGT-----ELLTG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CEKELLRIVDREYLFAYADDPCSCNYPLMQKLRQVLVDHAMNNGESEKNVNSSIFQKIGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         TRGHSAVRLVVLEALTNFLNHRITFIVPLRGSISASGDLSPLSYIAGAITGHPDVKVHVL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               SADTRTEDAVSLOKALIEHQLCGVTPTSXSSFSVGRGLE--NTLPLEVVRGAMVIRVNSL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    LATTLANGFINGSHAAPTKSAAGPTSALRRTPGLDGHAAHQSQLEIVQELLSDPTDDVVE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             VQQETIGSNVSRIYEAIKDGRINHVLVKML
                          DIHIAAYASELGHLANPVTTFYQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYC
                                                                                                                                                                                                                                                                         LLSAIFAEVMNGKP-EFTDHLTHKLKHHPGQIEAAAIMEHILDGSAYMKAAKKLHETDPL
                                                                                                                                                                                                                                                                                                                     ALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVE----HEBEVK 356
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        TSHRRTKQGGALQKELIRFLNAGI ---
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        LSGYSLTVRDVVG-AARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSV--YGVTTGFGG 124
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      METVTKNGYQNGSLESLCVNQRDPLSW-----GVAAEAMKGSHLDEVKRMVADYRKPVVK
EIAMASYCSELQYLANPVTTHVQSAEQHNQDVNSLGLISSRKTAEAVDILKLMSTTFLVA
                                                                                       NFQGTPIGVSMDNVRLAIASIGKLLFAQFSELVNDFYNNGLPSNLTASRNPSLDYGFKGA
                                                                                                                                  NFQASAVSISMEKTRLALALIGKLNFTQCTELLNAAMNRGLPSCL-AAEDPSLNYHGKGL
                                                                                                                                                                                QXP----KQDRYALRTSPQWLGPQIEVIRFSTKSIEREINSVNDNPLIDVSRNKAIHGG
                                                                                                                                                                                                                            VKDDEGILRQDRYPLRTSPQFLGPLVEDMMHAYSTLSLENNTTTDNPLLDVENKQTAHGG
                                                                                                                                                                                                                                                                                                                                                                                                              HEGTEKIMFAREAISLFGLEA--VVLGPKEGLGLVNGTAVSASMATLSLHDSHMLSLLSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                            LOGYSGIRFEILEAITRILINNNITPCLPLRGTITASGDLVPLSYIAGLLTGRPNSKA---
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             LGGETLTIAQVASIAGHDTGDVKVELSESARPGVKASSDWVMDSMDKGTDSYGVTTGFGA 115
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      28.1%; Score 1016; DB 2; ilarity 35.8%; Pred. No. 1.8e-59; Conservative 132; Mismatches 276;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      ---FGNGTETCHTLPHSATRAAMLVRINTL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       704
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Length 715;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     68;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  674
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            689
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       620
                                                                                                                                         475
                                                                                                                                                                                                                                                                              342
                                                                                              457
                                                                                                                                                                                       397
                                                                                                                                                                                                                                   416
                                                                                                                                                                                                                                                                                                                                                                        283
                                                                                                                                                                                                                                                                                                                                                                                                                   300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                 223
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      182
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         67
```

```
C;Keywords: ammonia-lyase; carbon-nitrogen lyase F;203-205/Cross-link: 5-imidazolinone (Ala-Gly) #status predicted F;204/Modified site: dehydroalanine (Ser) #status predicted
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 A;Map position: 3
A;Introns: 135/2
A;Note: T4D2.190
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ś
                                 뮍
                                                                    8
                                                                                                           β
                                                                                                                                        Ş
                                                                                                                                                                                   밁
                                                                                                                                                                                                                  Ş
                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                      Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 A;Cross-references: EMBL:AL132958; NID:g6434245; PIDN:CAB64229.1; PIA;Experimental source: cultivar Columbia; BAC clone f492 R;Wanner, LA.; Li, G.; Ware, D.; Somssich, I.E.; Davis, K.R. Plant Mol. Biol. 27, 327-338, 1995
Plant Mol. Biol. 27, 327-338, 1995
A;Title: The phenylalanine ammonia-lyase gene family in Arabidopsis A;Reference number: S52990; MUID:95195160; PMID:7888622
A;Accession: S52991
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         A;Cross-references: EMBL:L33678; NID:g497420; PIDN:AAC18871.1; PID:g497421 \bar{A}_i;Note: the nucleotide sequence was submitted to the EMBL Data Library, Jun
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             A;Molecule type: DNA
A;Residues: 1-205,'H',207-234,'E',236-717 <WAN>
A;Cross-references: EMBL:L33678; NID:g497420; P)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 A; Molecule type: DNA
A; Residues: 1-717 < NYA>
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      8 8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     P.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       B 8
                                                                                                                                                                                                                                                                                                                                                                                                                                                              Superfamily: histidine ammonia-lyase
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Genetics:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Status: nucleic
                                                                                                                                                                                                                                                                                                                                   Matches
                                                                                                                                                                                                                                                                                                                                                                    Query Match
                                                                          183
                                                                                                             116
                                                                                                                                                123
   243
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           640
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       518
                                                                                                                                                                                     56
                                                                                                                                                                                                                        65
                                                                                                                                                                                                                                                             μ
                                                                                                                                                                                                                                                                                              U
                                                                                                                                                                                                                                                                                                                                                   Similarity
                                                                                                                                              GGSADTRTEDAVSLOKALIEHOLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIRVNSL
HEGTE-KIMFAREAISLFGLEA--VVLGPKEGLGLVNGTAVSASMATLSLHDSHMLSLLS
                                     LOGYSGIRFEILEAITSLLNHNISPSLPLRGTITASGDLVPLSYIAGLLTGRPNSKA---
                                                                        TRGHSAVRLVVLEALTNELNHRITPIVPLRGSISASGDLSPLSYIAGAITGHPDVKVHVL
                                                                                                           GATSHRRTKNGTALQTELIRFLNAGI-----FGNTKETCHTLPQSATRAAMLVRVNTL
                                                                                                                                                                                 VVNLGGETLTIGQVAAISTVGGSVKVELAETSRAGVKASSDWVMESMNKGTDSYGVTTGF
                                                                                                                                                                                                                    VVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSV--YGVTTGF
                                                                                                                                                                                                                                                           MDQIEAMLCGGGEKTKVAVTTKTLADPLNW-----GLAADQMKGSHLDEVKKMVEEYRRP
                                                                                                                                                                                                                                                                                              LDSLATTLANGFTNGSHAAPTKSAAGPTSALRRTPGLDGHAAHQSQLEIVQELLSDPTDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              EFDKVFTAMCQGKIIDPMLECL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   NVSRIYEAIKDGRINHVLVKML
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      LLPKEVESARAAYDSGNSAIDNKIKECRSYPLYKFVREELGTV-----LLTGEKVQSPGE 682
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        -LTREVRN-RFWQTPSSQAPAHAYLSPRTRVLYSFVREELGVQARRGDVFVGVQQETIGS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               FAYVDDPCSATYPLMQKLRQVF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       LCQAIDLRHLEENLKSAVKNTVSQVSKRVLTTGANGE---LHPSRFCEKELLKVVDREYV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      TLQAVDLRAMELDFKKQFDFLLFTLLQQHLGTGLDVNALALEVKKALNKRLEQ------
                                                                                                                                                                                                                                                                                                                                 Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               acid sequence not shown; translation
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  -TTTYDLEPRWHDAFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAIS-
                                                                                                                                                                                                                                                                                                                                                   28.1%;
                                                                                                                                                                                                                                                                                                                                 140;
                                                                                                                                                                                                                                                                                                                                                   Score 1015.5;
Pred. No. 1.9e
                                                                                                                                                                                                                                                                                                                             Mismatches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     719
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             VDHALENGENEKNFSTSV-FOKIEAFEEELKA
                                                                                                                                                                                                                                                                                                                                                     .5; DB 2;
1.9e-59;
                                                                                                                                                                                                                                                                                                                                 284;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 not
                                                                                                                                                                                                                                                                                                                                 Indels
                                                                                                                                                                                                                                                                                                                                                                    Length 717;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 shown
                                                                                                                                                                                                                                                                                                                               45;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                PID:g6630746
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Weichselgartner,
                                                                                                                                                                                                                                                                                                                               Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           June
                                                                        242
                                                                                                                                              182
                                                                                                                                                                                   115
                                                                                                                                                                                                                    122
                                                                                                                                                                                                                                                         ភូ
                                     225
                                                                                                                                                                                                                                                                                              64
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             627
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  639
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       574
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        588
                                                                                                                                                                                                                                                                                                                                 17
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1994
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             .
:
                         Ş
                                                                      B
                                                                                                   Ş
                                                                                                                                            밁
                                                                                                                                                                                                                                                                                            C;Superfamily: histidine ammonia-lyase C;Keywords: ammonia-lyase; carbon-nitrogen lyase F;199-201/cross-link: 5-imidazolinone (Ala-Gly) : F;200/Modified site: dehydroalanine (Ser) #statu
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  R;Frank, R.L.; Vodkin,
DNA Seq. 1, 335-346, 1
A;Title: Sequence and
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       RESULT 10
$22991
$22991

phenylalanine ammonia-lyase (EC 4.3.1.5) 1 - soybean

C;Species: Glycine max (soybean)

C;Species: 06-Jan-1994 #sequence_revision 10-Nov-1995 #text_change 16-Jul-1999
В
                                                                                                                                                                             Ś
                                                                                                                                                                                                                                                                                                                                                                      A; Introns: 131/2
                                                                                                                                                                                                                                                                                                                                                                                                                                          A; Molecule type: DNA
A; Residues: 1-713 < FRA>
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   A; Title: Sequence and structure of a phenylalanine ammonia-lyase A; Reference number: S22991; MUID:92190550; PMID:1799682
                                                                                                                                                                                                                                                                                                                                                                                        A;Gene: PAL1
                                                                                                                                                                                                                                                                                                                                                                                                                           A; Cross-references:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             문
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      뫄
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 A; Accession: S22991
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Вb
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              닭
                                                                                                                                                                                                                                                                            ;200/Modified site: dehydroalanine (Ser) #status predicted
                                                                                                                                                                                                                                                                                                                                                                                                     Genetics:
                                                                                                                                                                                                                        Matches
                                                                                                                                                                                                                                                         Query Match
                                                                                                                                                                                                                                       Local
                                     132
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              707
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    648
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         580
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             593
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  523
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     539
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          463
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             479
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  403
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        343
121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           694 CEGKLIDPLMDCL 706
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      226
                                                                        61
                                                                                                         74
                                                                                                                                                                                 14 NGFTNGSHAAPTKSAAGPTSALRRTPGLDGHAAHQSQLEIVQELLSDPTDDVVELSGYSL
                                                                                                                                                ហ
                                                                                                                                                                                                                                     Similarity
                                   DAVSLOKALIEHOLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIRVNSLTRGHSAVRL
QGGALQKELIRFLNAGI-
                                                                        TIAQVAAVAGHDHGVAVELSESAREGVKASSEWVMNSMNNGTDSYGVTTGFGATSHRRTK
                                                                                                                                                NGHQNGSFCLST--AKGNNDPLNW--GAAAEAMKGSHLDEVKRMVAEYRKPVVRLGGETL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     IAAYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GTPIGVSMDNTRLAIAAIGKLMFAQFSELVNDFYNNGLPSNLTASSNPSLDYGFKGABIA 462
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 QALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEVKVKD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    -TGPDGESLTAKEAFEKAGISTGFFDLQPKEGLALVNGTAVGSGMASMVLFEANVQAVLA
                                                                                                         TVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSV--YGVTTGFGGSADTRTE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 RAAYGNGTAPIPNRIKECRSYPLYRFVREELGTKLLTGEKVV-
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   FWQTPSSQAPAHAYLSP-RTRVLYSFVREELGVQARRGDVFVGVQQETIGSNVSRIYEAI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         VDDPCSATYPLMQRLRQVIVDHALSNGETEKNAVTSI-FQKIGAFEEELKAVLPKEVEAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         DLEP--RWHDAFSYATGTVVE-LLSSSPSANVTLTAVNAWKVASAEKAIS--LTREVRNR
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                AVDLRHLEENLRQTVKNTVSQVAKKVLTTGINGE----LHPSRFCEKDLLKVVDREQVFTY
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   AVDIRAMELDEKKQEDPILETILQQHLGTGLDVNALALEVKKALNKRI-----EQTTTY
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          MASYCSELQYLANPVISHVQSAEQHNQDVNSLGLISSRKTSEAVDILKLMSTTFLVGICQ 522
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      PLOKPKODRYALRTSPOWLGPOIEVIROATKSIEREINSVNDNPLIDVSRNKAIHGGNFO
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         DEGILRODRYPLRTSPOFIGPLVEDMMHAYSTLSLENNTTTDNPLLDVENKQTAHGGNFQ 419
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              EVESATFAEVMSGKP-EFTDHLTHREKHHPGQTEAAATMEHTEDGSSY-MKLAQKVHEMD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ASAVSISMEKTRLALALIGKLNFTQCTELLNAAMNRGLPSCL-AAEDPSLNYHGKGLDIH 478
                                                                                                                                                                                                                        Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                         EMBL: X52953; NID: g18376;
                                                                                                                                                                                                                                       28.0%;
                                                                                                                                                                                                                      120;
                                                                                                                                                                                                                    Score 1011; DB 2;
Pred. No. 3.8e-59;
20; Mismatches 282
 FGNGTESSHTLPHTATRAAMLVRINTLLQGYSGIRF
                                                                                                                                                                                                                                                                                                                                                                                                                           PIDN: CAA37129.1;
                                                                                                                                                                                                                                                         Length 713;
                                                                                                                                                                                                                      Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ---SPGEEFDKVFTAM
                                                                                                                                                                                                                                                                                                                                                                                                                           PID:g18377
                                                                                                                                                                                                                      60;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      gene
                                                                                                                                                                                                                    Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      from
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           647
                                                                          120
                                                                                                           131
                                                                                                                                              60
                                     191
                                                                                                                                                                                   73
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    706
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         638
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                579
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     592
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Glycine
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           538
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        402
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              342
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   359
                                                                                                                                                                                                                      19
```

```
nd developing plants.

A;Reference number: S17444; MUID:91355933; PMID:1715786

A;Recession: S17444

A;Molecule type: mRNA

A;Residues: 1-725 GOW>

A;Cross-references: EMBL:X58180; NID:g19649; PIDN:CAA41169.1; PID:g19

A;Cross-references: train cv. Apollo

C;Genetics:
A;Gene: PAL1

C;Guperfamily: histidine ammonia-lyase
C;Keywords: ammonia-lyase; carbon-nitrogen lyase
F;211-213/Cross-link: 5-midazolinone (Ala-Gly) #status predicted
F;212/Modified site: dehydroalanine (Ser) #status predicted
                                                                                                                                                                                                                                                                                                                                    RESULT 11
$17444
$17444

Clark tensor sativa (alfalfa)
Clark tensor sativa (alfalfa)
Clark tensor sativa (alfalfa)
Clark tensor sativa (alfalfa)
Clark tensor sativa (alfalfa)
Clark tensor sativa (alfalfa)
Clark tensor sativa (alfalfa)
Clark tensor sativa (alfalfa)
R.Gowri, Glark tensor sativa (alfalfa)
Plant Mol. Biol. 17, 415-429, 1991
Alfalfa (Medicago sativa L.). 12. S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          멍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  g
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ś
                밁
                                          Š
                                                                           Query Match
Best Local S
Matches 261
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    691
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     465
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               345
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                708
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   485
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  405
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              426
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            366
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       310
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   174
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           605
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          291
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       231
                39
                                               40
                                                                                           Similarity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  OGKIIDPLMECL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  EILEAITKILNNNVTPCLDLRGTITASGDLVPLSYIAGLLTGRPNSKA-VGPSG--EVLN 230
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     VVLEALTNFLNHRITDIVPLRGSISASGDLSPLSYIAGAITGHPDVKVHVLHEGTEKIMF
                GVAAEAMKGSHLDEVKRMVAEYRKPVVRLGGETLTISQVAAIAAHDHGVQVDLSESARDG
                                             GLDGHAAHQSQLEIVQELLSDFTDDVVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRAR
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  DGRINHVLVKML 719
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             AAYESGKAAIPNKIQECRSYPLYKFVREELGT----GLLTGEKVRSPGEEFDKLFTAMC 690
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        WQTPSSQAPAHAYLSP-RTRVLYSFVREELGVQARRGDVFVGVQQETIGSNVSRIYEAIK
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            IDDPCSATYPLMQKLRQVLVDHALVNAECEKDVNSSIFQKIAIFEEELKNLLPKEVEGAR
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        ---ATGTVVELLSSSPSANVTLTAVNA------WKVASAEKAIS--LTREVRNRF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          LEENLKNSVKNTVSQVSKRILTTG--VNG-ELHPSRFCEKDLLKVVDREY-----IFSY
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    MELDFKKQFDPLLPTLLQQHLGTGLDVNALALEVKKALNKRLEQTTTYDLEPRWHDAFSY
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    ELQYLANPVTTHVQSAEQHNQDVNSLGLISSRKTNEAIEILKLMSSTFLIALCQAIDLRH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQAVDLRA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  SMDNTRLALASIGKLMFAQFSELVNDFYNNGLPSNLTASRNPSLDYGFKGAEIAMASYCS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           SMEKTRLALALIGKLNFTQCTELLNAAMNRGLPSCL-AAEDPSLNYHGKGLDIHIAAYAS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           QDRYALRTSPQWLGPLIEVIRFSTKSIEREINSVNDNPLIDVSRNKALHGGNFQGTPIGV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           QDRYPLRTSPQFLGPLVEDMMHAYSTLSLENNTTTDNPLLDVENKQTAHGGNFQASAVSI 425
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          MQGKP-EFTDHLTHKLKHHPGQIEAAAIMEHILDGSSYMKAAKKLHEIDPLQKP----K
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       MVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVE----HEEEVKVKDDEGILR 365
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       AKEAFELASINSEFFELQPKEGLALVNGTAVGSGLASMVLFEANILAVLSEVLSAIFAEV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            AREAISLFGL--EAVVLGPKEGLGLVNGTAVSASMATLSLHDSHMLSLLSQALTALTVEA 309
                                                                           28.0%; Score 1009; DB 2; 35.9%; Pred. No. 5.3e-59; ive 127; Mismatches 241;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    702
                                                                                                         Length 725;
                                                                           Indels
                                                                                                                                                                                                                                                 PID:g19650
                                                                                                                                                                                                                                                                                                                                           Sequence
                                                                           98;
                                                                                                                                                                                                                                                                                                                                                                                                         16-Jul-1999
                                                                           Gaps
                                                                                                                                                                                                                                                                                                                                             analysis
                98
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            635
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          575
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        604
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  464
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                484
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               404
                                               99
                                                                                                                                                                                                                                                                                                                                             o
fi
                                                                                                                                                                                                                                                                                                                                             phen
                                                                                                                                                                                                                                                                                                                                           RESULT 12
S04463
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                                                                                                                                                                Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                    맑
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ъ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       S
Query Match
Best Local Similarity
Matches 266; Conser
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 328
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              546
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            507
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          515
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         447
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       456
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      387
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              336
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              269
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         276
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         212
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      218
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    152
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              100
                                                                                                                                                                                                                                                                                                                                                                                                           708
                                                                                                                                                                                                                                                                                                                                                                                                                                       713 HVLVKML
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  99
                                                                                                                                                                                                                                                                                                                                                                                                           DELLECL
   Conservative
                                                                                                                                                                                                                                                                                                                                                                                                             714
                                                                                                                                                                                                                                                                                                                                                                                                                                         719
              27.9%;
   130;
```

```
A;Introns: 136/2
C;Superfamily: histidine ammonia-lyase
C;Keywords: ammonia-lyase; carbon-nitrogen lyase
F;202-204/Cross-link: 5-imidazolinone (Ala-cly) #status predicted
F;203/Modified site: dehydroalanine (Ser) #status nradicted
                                                                                                                                                                                                                                                    A;Title: A phenylalanine ammonia-lyase gene from parsley: structure, A;Reference number: S04463, MUID:89356635; PMID:2767049
A;Accession: S04463
A;Molecule type: DNA
A;Residues: 1-716 <LOI>A;Residues: 1-716 <LOI>A;Cross-references: EMBL:X15473
C;Genetics:
                                                                                                                                                                                                                                                                                                                                                                                                                                                          phenylalanine ammonia-lyase (EC 4.3.1.5) - parsley C;Species: Petroselinum crispum (parsley) C;Date: 04-Dec-1992 #sequence_revision 04-Dec-1992 C;Accession: S04463 R;Lois, R.; Dietrich, A.; Hahlbrock, K.; Schulz, W. EMBO J. B, 1641-1648, 1989
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GNPTIPNKINGCRSYPLYKFVREELGTGLLTGENVI----SPGEECDKLFSAMCQGKII
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      ARKINEAIBILQLMSSTFLIALCQAIDLRHLEENLK------
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             ARRTAEANDVISILIASHIYCTIQAVDIRAMEIDFKKQFDFILFTILQQHIGTGIDVNAI 574
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GLPSCL-AAEDPSLNYHGKGLDIHIAAYASELGHLANPVTTFVQPAEMGNQAVNSLALIS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           INSVNDNPLIDVSRNKALHGGNFQGTPIGVSMDNTRLALASIGKLMFAQFSELVNDFYNN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            AIMEHILDGSSY-VKAAKKLHEIDPLQKPKQDRYALRTSPQWLGPLVEVIRFSTKSIERE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               RNIRTLISGSSFAVEHEEEVKVKDDEGILRQDRYPLRTSPQFLGPLVEDMMHAYSTLSLE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            VKASSEWVMESMNKGTDSYGVTTGFGATSHSRTKQGGALQKELIRFLNAGI-----FG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             VDKSVDFLKAQLQNSV--YGVTTGFGGSADTRTEDAVSLQKALIEHQLCGVTPTSXSSFS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          VLVDHALVNGESEKNFNTSIFQ----KIATFEBELKTLLPKEV-----ESARTAYES
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              -----SSSPSANVTLTAVNAWKVASAEKAIS--LTREVRNRFWQTPSSQAPAHAY
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        KNTVSQVAKKTLTMGVNGELHPSRFCEKDLLKVVDREH-VFAYIDDPCSATYPLSQKLRQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               ALEVKKALNKRLEQTTTYDLEP------RWHDAFSY-----ATGTVVELL--
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          GLPSNISASRNPSLDYGFKGABIAMASYCSELQYLANPVTTHVQSAEQHNQDVNSLGLIS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  NNTTTDNPLLDVENKQTAHGGNFQASAVSISMEKTRLALALIGKLNFTQCTELLNAAMNR 455
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                NGTAVSASMATLSLHDSHMLSLLSQALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       SGDLVPLSYIAGLLTGRPNSKA----HGPSGEVLNAKEAFNLAGINAEFFELQPKEGLALV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              SGDLSPLSYIAGAITGHPDVKVHVLHEGTEKIMFAREAISLFGLEA--VVLGPKEGLGLV 275
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           NGTESNHTLPKTATRAAMLVRINTLLQGYSGIDFEILEAITKPLNKTVTPCLPLRGTITA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          VGRGLENTLPLEVVRGAMVIRVNSLTRGHSAVRLVVLEALTNFLNHRITPIVPLRGSISA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                ----RTRVLYSFVREELGVQARRGDVFVGVQQETIGSNVSRIYEAIKDGRIN
Score 1006; DB 2;
Pred. No. 8.2e-59;
0; Mismatches 275;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     #text_change
                                                   Length 716;
   Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               VSN----NSV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        21-May-1999
   68
                                                                                                                                                                                                                                                                                                                                                                                                                                        regulation
   Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   157
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               545
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               386
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      335
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              211
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     217
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            151
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           604
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  613
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                506
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       514
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 446
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      395
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             268
   18;
                                                                                                                                                                                                                                                                                                                                                                                                                                           and iden
```

```
RESULT 13

$25303

$25303

phenylalanine ammonia-lyase (EC 4.3.1.5) - garden pea phenylalanine ammonia-lyase (EC 4.3.1.5) - garden pea phenylalanine sativum (garden pea)

C;Species: Pisum sativum (garden pea)

C;Species: Pisum sativum (garden pea)

C;Accession: $25303

R;Kawamata, S.; Yamada, T.; Tanaka, Y.; Sriprasertsak, P.; Plant Mol. Biol. 20, 167-170, 1992

Plant Mol. Biol. 20, 167-170, 1992

A;Title: Molecular cloning of phenylalanine ammonia-lyase A;Reference number: $25303

A;Accession: $25303

A;Accession: $25303

A;Accession: $25303

A;Accession: $25303

A;Accession: $25303

A;Residues: 1-723 KAWA
              A;Cross-references: EMBL:D10001; NID:g217979; PIDN:BAA00885.1; PI
C;Superfamily: histidine ammonia-lyase
C;Keywords: ammonia-lyase; carbon-nitrogen lyase
F;209-211/Cross-link: 5-imidazolinone (Ala-Gly) #status predicted
F;210/Modified site: dehydroalanine (Ser) #status predicted
                                                                                                                                                                                                                                                                                                                                                                                                                                      632
                                                                                                                                                                                                                                                                                                                                                                                                                                                                        642
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             589
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 462
                                                                                                                                                                                                                                                                                                                                                                                                   701
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               522
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              539
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    479
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     402
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         342
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             284
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               225
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  242
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   167
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    182
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       116
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      122
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         56
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       νρ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 GTPIGVSMDNTRLAIAAIGKLMFAQFSELVNDFYNNGLPSNLSGGRNPSLDYGFKGAEIA
                                                                                                                                                                                                                                                                                                                                                                                                     RIYEAIKDGRINHVLVKML
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 MASYCSELQFLANPVINHVQSAEQHNQDVNSLGLISSRKTSEAVEILKLMSTTFLVGLCQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           ASAVSISMEKTRIALALIGKLNFTQCTELLNAAMNRGLPSCLA-AEDPSLNYHGKGLDIH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       LHEGTEKIMFAREAISLFGLEA--VVLGPKEGLGLVNGTAVSASMATLSLHDSHMLSLLS
                                                                                                                                                                                                                                                                                                                                                                  KVFIAMSKGEIIDPLLECL
                                                                                                                                                                                                                                                                                                                                                                                                                                      KEVESARAALESGNPAI PNRI EECRSYPLYKFVRKELGT----EYLTGEKVTSPGEEFE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                      REVRN-REWQTPSSQAPAHAYLSPRTRVLYSEVREELGVQARRGDVEVGVQQETIGSNVS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         IDDPCSATYPLMQKLRQ-----
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              AVDIRAMELDFKKQFDFLLPTLLQQHLGTGLDVNALALEVKKALNKRLEQ-------
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  IAAYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       PLOKPKODRYALRTSPOWLGPOIEVIRSSTKMIEREINSVNDNPLIDVSRNKAIHGGNFO
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             EVMSÄTFAEVMOGKP-BFTDHLTHKLKHHPGOTEAAAIMEHTLDGSAY-VKAAOKLHEMD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            QALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEVKVKD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   LLOGYSGIRFEILEAITKFLNONITPCLFLRGTITASGDLVFLSYIAGLLTGRPNSKA--
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      FGGSADTRTEDAVSLOKALIEHOLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIRVNS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       VVKLGGETLTISQVAAISARDGSGVTVELSBAARAGVKASSDWVMDSMNKGTDSYGVTTG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          VVELSGYSLTVRDVVG-AARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSV--YGVTTG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            ----TTTYDLEPRWHDAFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAIS--LT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               AIDLRHLEENLKSTVKNTVSSVAKRVLTMG-
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          DEGILRODRYPLRTSPOFLGPLVEDM/HAYSTLSLENNTTDNPLLDVENKQTAHGGNFQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               -VGPTGVILSPEEAFKLAGVEGGFFELQPKEGLALVNGTAVGSGMASMVLFEANILAVLA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                LTRGHSAVRLVVLEALTNELNHRITPIVPLRGSISASGDLSPLSYIAGAITGHPDVKVHV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     FGATSHRRTKQGGALQKELIRFLNAGI-----FGNGSDNTLPHSATRAAMLVRINT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             ATT--NGHVNGN-----
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           ATTLANGFTNGSHAAPTKSAAGPTSALRRTP----GLDGHAAHQSQLEIVQELLSDPTDD
                                                                                                                                                                                                                                                                                                                                                                    705
                                                                                                                                                                                                                                                                                                                                                                                                   719
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             -GMDFCMKTEDPLYWGIAAEAMTGSHLDEVKKMVAEYRKP
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          -TLVEHALKNGDNERNLSTSIFQKIATFEDELKALLP
                                                                                                                                                                                                                                         03-Feb-1994 #text_change
                                                                                                                                                        e ammonia-lyase
PMID:1515609
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               - VNG-ELHPSRFCEKDLLRVVDREYIFAY
                                                                                                                                                                                                            P.; Kato,
                                                                                                                                                                           CDNA
                                                                                                                                                                         from
                                                                                    PID:g217980
                                                                                                                                                                                                                                               20-Jun-2000
                                                                                                                                                                                                          H.; Ichinose,
                                                                                                                                                                           Pisum sativum
                                                                                                                                                                                                                                                                                                                                                                                                                                      686
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          631
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            641
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  538
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     461
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        478
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               578
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              588
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 521
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       401
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          419
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           341
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            359
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               283
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                299
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     166
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             55
                                                                                                                                                                                                                                                                                                                                                                                                                                                                        700
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 224
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             64
                                                                                                                                                                                                            ۲.,
                                                                                                                                                                                                            Kato
A; Molecule type: mRNA
A; Residues: 1-712 < PEL>
A; Cross-references: EMBL: X78269; NID: g633596; PIDN: CAA55075.1; PID: g633597
A; Experimental source: cultivar Samsun NN; tissue-type leaves after infection
                                                                                      A; Accession: T03663
                                                                                                                                                                                                                                                                                                                                            δ
                                                                                                                                                                                                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                                                                                                                                                                               Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        дb
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    5
                                                                  Status: preliminary; translated
                                                                                                                                                                                                                                                                                                                 684
                                                                                                                                                                                                                                                                                                                                                  686
                                                                                                                                                                                                                                                                                                                                                                                   632
                                                                                                                                                                                                                                                                                                                                                                                                                      637
                                                                                                                                                                                                                                                                                                                                                                                                                                                       578
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        593
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             523
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            533
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               463
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                473
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 403
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  414
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     343
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      354
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         285
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            233
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                175
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 182
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    122
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          294
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              242
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     122
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      62
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       64
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             φ
                                                                                                                                                                                                                                                                                                                 KVI----SPGEECDKLFTAICQGKIIDPLLQCL
                                                                                                                                                                                                                                                                                                                                   VFVGVQQETIGSNVSRIYEAIKDGRINHVLVKML
                                                                                                                                                                                                                                                                                                                                                                                     ELKTLLPKEV
                                                                                                                                                                                                                                                                                                                                                                                                                      AIS--LTREVRNRFWQTPSSQAPAHAYLSP------
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        DLEPRWHDAFSY ---- ATGTVVE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    FGATSHRRTKQGGALQKELIRFLNAGI-----
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            135;
                                                                     from GB/EMBL/DDBJ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Mismatches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                9e-59;
                                                                                                                                                                                                                                                                                                                                                  719
```

음 성

멍 5 망 5 당 δ 몽 \$ 밁 S

멂 δ B 5 Db 8 g Ş g 8 В δ 밁 Ş

λq tobac

```
Query Match
Best Local Similarity
Matches 270; Conser
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        LYCTLQAVDLRAMELDFKKQFDPLLFTLLQQHLGTGLDVNALALEVKKALNKRLEQTTTY
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   KGLDIHIAAYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               HGGNFQASAVSISMEKTRLALALIGKLNFTQCTELLNAAMVRGLPSCL-AAEDPSLNYHG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               EVKVKDDEGILRODRYPLRTSPORGPLVEDMMHAYSTLSLENNTTTDNPLLDVENKOTA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ILAVÍSEVÍSÁIFAEVNOGKP-EFTDHLTHKLKHHPGÓIEAAAIMEHILDGSAY-VKAAK
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          MISILSQALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLISGSSFAVEHEE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  ---GTSGEILNAKEAFQSAEINDGFFELQ-----PKEGLALVNGTAVGSGLASIVLFEAN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      LHEGTE-KIMFAREAI------SLFGLEAVVLGPKEGLGLVNGTAVSASMATLSLHDSH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         LTRGHSAVRLVVLEALTNFLNHRITPIVPLRGSISASGDLSPLSYIAGAITGHPDVKVHV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     LIALCQAVDLRHLEENLKNSVKNIVSQVAKRTLTTG--VNG-ELHPSRFCEKDLLRVV--
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                KGSEIAMASYCSELQYLANPVITHVQSAEQHNQDVNSLGLISSRKTYEAIEILQLMSSTF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              {\tt HGGNFQGTPIGVSMDNTRLALASIGKLLFAQFSELVNDFYNNGLPSNLSASRNPSLDYGF}
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       KLHEMDPLQKPKQDRYALRTSPQWLGPLIEVIRFSTKSIEREINSVNDNPLIDVSRNKAL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                LLQGYSGIRFEILEAITKLINNNVTPCL-LRGTITASGDLVPLSYIAGLLTGRPNSKAH-
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               FGGSADTRTEDAVSLOKALIEHQLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIRVNS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           PVVRLGGETLTISQVAAIAAHDHGVKVELSESARAGVKASSDWVMESMNKGTDSYGVTTG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              DVVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSV--YGVTTG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      AITKNNGYESFCVTNAKNNNMKVNSADPLNW-----GVAAEAMKGSHLDEVKRMVEEYRK
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          ATTLANGF----TNGSHAAPTKSAAGPTSALRRTPGLDGHAAHQSQLEIVQELLSDPTD
                                                                                                                                                                                                                                                                                                                                                                                                     -DREH-VFAYIDDPCSATYPLMQKLRQVLVDHALVNGESEKNLNTSIFQ--KIATFED
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    27.9%;
                                                                                                                                                                                                                                                                                                                          - ESTRAAYESGNÉTVENKINGCRSYPLYRÉVRQELGTGLLTGE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Score 1005.5;
Pred. No. 9e-
                                                                                                                                                                                                                                                                                                                                                                                                                                           -----LLSSSPSANVTLTAVNAWKVASAEK
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             FGNGTESSHTLPHTATRAAMLVRINT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               258;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       DB 2;
                                                                                                                                                                                                                                                                                                                                                             RTRVLYSFVREELGVQARRGD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Length
                         cloning
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         723;
                                                                                                        16-Jul-1999
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  91;
                           and
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Gaps
                           gene
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 413
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        592
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           402
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            353
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          293
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   181
                                                                                                                                                                                                                                                                                                                            683
                                                                                                                                                                                                                                                                                                                                                                  685
                                                                                                                                                                                                                                                                                                                                                                                                     631
                                                                                                                                                                                                                                                                                                                                                                                                                                             636
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     577
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                522
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      532
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              462
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   472
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       342
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  232
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             174
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              63
                           expression
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  23
```

```
RESULT 15
$48725

phenylalanine ammonia-lyase (EC 4.3.1.5) 2 - pa
(;Species: Petroselinum crispum (parsley)
C;Jate: 28-Oct-1995 #sequence_revision 10-Nov-1
C;Accession: $48725
R;Appert, C.; Logemann, E.; Hahlbrock, K.; Schm
Rur. J. Biochem. 225, 491-499, 1994
A;Title: Structural and catalytic properties of
A;Reference number: $48725; MUID:95010141; PMID
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             C; Genetics:
A; Gene: PAL
C; Function:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            δÃ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              A,Description: catalyzes the deamination of L-phenylalanine to transly induced during the hypersensitive reaction to TM A;Note: strongly induced during the hypersensitive reaction to TM C;Superfamily: histidine ammonia-lyase C;Keywords: ammonia-lyase; carbon-nitrogen lyase F;198-200/Cross-link: 5-imidazolinone (Ala-Gly) #status predicted F;199/Modified site: dehydroalanine (Ser) #status predicted
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            당
                                                                                                                                                                                                                                                                                                                                              Ş
                                                                                                                                                                                                                                                                                                                                                                                    멍
                                                                                                                                                                                                                                                                                                                                                                                                                         Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                                S
                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Query Match
    rt, C.; Logemann, E.; Hahlbrock, K.; Schmid, J.; Am. Blochem. 225, 491-499, 1994
e: Structural and catalytic properties of the four rence number: $48725; MUID:95010141; PMID:7925471
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Local
                                                                                                                                                                                                                                                                                                                                                                                                                                                                   499
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     520
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               461
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     379
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           401
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               320
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   341
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         261
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               281
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  204
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        223
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              144
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  164
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          107
                                                                                                                                                                                                                                                                                                                                                  628
                                                                                                                                                                                                                                    999
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      49
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      93
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  33
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Similarity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      SQLEIVQELLSDFTDDVVELSGYSLTVRDVVGAARK--GRRVRVQNDDEIRARVDKSVDF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       LLSGSSFAVEHEEEVKVKDDEGILRQDRYPLRTSPQFLGPLVEDMMHAYSTLSLENNTTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GSGLASMYLFDANILAVFSEVLSAIFAEVNNGKP-EFTDHLTHKLKHHPGQIEAAAINEH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CHTLPQSGTRAAMLVRINTLLQGYSGIRFEILEAITKLLNHNVTPCLPLRGTITASGDLV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      LKAQIQNSV--YGVTTGFGGSADTRTEDAVSLQKALIEHQLCGVTFTSXSSFSVGRGLE-
                                                                                                                                                                                                                                  AELLTGEKVRSPGEECDKVFTAMCNGQIIDSLLECL 701
                                                                                                                                                                                                                                                                      GDVFVGVQQETIGSNVSRIYEAIKDGRINHVLVKML
                                                                                                                                                                                                                                                                                                                                                AWKVASAE---KAISLTREVRN-REWQTPSSQAPAHAYLSPRTRVLYSFVRBELGVQARR
                                                                                                                                                                                                                                                                                                                                                                                        RFCEKDLLRVVDREYVFRYADDACSANYPLMQKLRQVLVDHALENGENEKNANSSIFQ--
                                                                                                                                                                                                                                                                                                                                                                                                                           KALNKRIEGTTTYDLEPRWHDAFSYATGTVVELL----
                                                                                                                                                                                                                                                                                                                                                                                                                                                                   EAVDILKLMSSTYLVALCQAIDLRHLEENLRNAVKNTVSQVAKRTLIMGANGE---LHPS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     EANDVISILLASHIYCTIQAVDIRAMEIDFKKQFDPLLFTIIQQHIGTGIDVNALAIEVK
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           LTAGRNPSLDYGFKGSEIAMASYCSELQFLANPVTNHVQSAEQHNQDVNSLGLISARKTA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               L-AAEDPSLNYHGKGLDIHIAAYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     DNPLIDVSRNKALHGGNFQGTPIGVSMDNARLALASIGKLMFAQFSELVNDYYNNGLPSN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     DNPLLDVENKQTAHGGNFQASAVSISMEKTRLALALIGKLNFTQCTELLNAAMNRGLPSC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               SASMATLSLHDSHMLSLLSQALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  PLSYIAGLLTGRPNSKA-IGPNG--ETLNÄEEÅFRVAGVNSGFFELQPKEGLALVNGTAV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      PLSYIAGAITGHPDVKVHVLHEGTEKIMFAREAISLFGLEA--VVLGPKEGLGLVNGTAV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  -NTLPLEVVRGAMVIRVNSLTRGHSAVRLVVLEALTNFLNHRITPIVPLRGSISASGDLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      VMDSMSKGTDSYGVTTGFGATSHRRTKNGGALQKELIRFLNAGV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              SHLDEVKKMVAEFRKPVVKLGGETLTVAQVAATAAKDNAKTVKVELSEGARAGVKASSDW
                                                                                                                                                                                                                                                                                                              KILAFEGELKAV-LPKEVESARISLENGNPALANRIKECRSYPLYRFVREELG-----
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        27.8%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            131;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Score 1005; DB 2;
Pred. No. 9.5e-59;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Mismatches
                                                                                              10-Nov-1995 #text_change
                                                            Schmid, J.; Amrhein,
                                                                                                                                    parsley
                                                                                                                                                                                                                                                                        719
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Length 712;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Indels
                      phenylalanine
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        -----FGNGTES
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           to trans-cinnamic acid to TMV or to a fungal (
                                                                                                                                                                                                                                                                                                                                                                                                                             SSSPSANVTLTAVN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            52;
                                                                                                  16-Jul-1999
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Gaps
                        ammonia-lyase
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         579
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             498
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 519
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           460
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 378
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         319
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               340
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      260
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        280
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              203
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  222
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      143
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              163
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  92
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      106
                                                                                                                                                                                                                                                                                                                                                                                        613
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            17
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               elici
                        isd
```

Š

Ş 당 Ş 밁 Ş 밁 Ş 밁 S

밁

```
A;Accession: S48725
A;Status: nucleic acid sequence not shown
A;Molecule type: mRNA
A;Residues: 1-716 <APP>
A;Cross-references: EMBL:X81158; NID:g534892; PIDN:CA
A;Cross-references: EMBL:X81158; NID:g534892; PIDN:CA
C;Genetics:
A;Gene: PAL2
C;Superfamily: histidine ammonia-lyase
C;Keywords: ammonia-lyase; carbon-nitrogen lyase
F;202-204/Cross-link: 5-imidazolinone (Ala-Gly) #status pre
                                                                                                                                                     맑
                                                                        В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Query Match
Best Local
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Matches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Local Similarity
                                                                                                                 643
                                                                                                                                                         582
                                                                                                                                                                                                                                     525
                                                                                                                                                                                                                                                                         542
                                                                                                                                                                                                                                                                                                                  465
                                                                                                                                                                                                                                                                                                                                                       482
                                                                                                                                                                                                                                                                                                                                                                                             405
                                                                                                                                                                                                                                                                                                                                                                                                                                    423
                                                                                                                                                                                                                                                                                                                                                                                                                                                                         345
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 363
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      287
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           303
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  227
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      245
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               170
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    185
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          119
889
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      59
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                264;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          22
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   œ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        LANGFINGSHAAPTKSAAGPTSALRRTP----GLDGHAAHQSQLEIVQELLSDPTDDVVE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            TSHRRTKQGGALQKELIRFLNAGI------FGNGSDNTLPHSATRAAMLVRINTLLQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    SAIFAEVMQGKP-EFTDHLTHKLKHHPGQIEAAAIMEHILDGSAY-VKAAQKLHENDPLO
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           TALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEVKVKDDEG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GTEKIMFAREAISLFGLEA--VVLGPKEGLGLVNGTAVSASMATLSLHDSHMLSLLSQAL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             GYSGIRFEILEAITKFLNQNITPCLPLRGTITASGDLVPLSYIAGLLTGRPNSKA---VG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               SADTRTEDAVSLOKALIEHQLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIRVNSLTR
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      LGGETLTISQVAAISARDGSGVTVELSEAARAGVKASSDWVMDSMNKGTDSYGVTTGFGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            LSGYSLTVRDVVG-AARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSV--YGVTTGFGG
                                                                                                                                                     PCSATYPLMQKLRQ-----TLVEHALKNGDNERNMNTSIFQ--KIATFEDELKALLPK
                                                                                                                                                                                                                                                                                                                                                                                             IGMSMDNTRLAIAAIGKLMFAQFSELVNDFYNNGLPSNLSGGRNPSLDYGFKGAEIAMAS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                       KPKQDRYALRTSPQWLGPQIEVIRSSTKMIEREINSVNDNPLIDVSRNKAIHGGNPQGTP
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GHSAVRLVVLEALTNELNHRITPIVPLRGSISASGDLSPLSYIAGAITGHPDVKVHVLHE
VFIAMSKGEIIDPLLECL
                                     IYEAIKDGRINHVLVKML
                                                                          EVESARAALESGNPAIPNRIEECRSYPLYKFVRKELGI---
                                                                                                               EVRN-RFWQTPSSQAPAHAYLSPRTRVLYSFVREELGVQARRGDVFVGVQQETIGSNVSR
                                                                                                                                                                                            --TTTYDLEPRWHDAFSYATGTVVE--LLSSSPSANVTLTAVNAWKVASAEKAIS--LTR
                                                                                                                                                                                                                                     LRHLEENLKSTVKNTVSSVAKRVLTMG--VNG-ELHPSRFCEKDLLRFVDREYIFAYIDD
                                                                                                                                                                                                                                                                           LRAMELDFKKQFDPLLPTLLQQHLGTGLDVNALALEVKKALNKRLEQ--------
                                                                                                                                                                                                                                                                                                                  YCSELOFLANDVINHVQSAEQHNQDVNSLGLISSRKTSEAVEILKLMSTTFLVGLCQAID
                                                                                                                                                                                                                                                                                                                                                     YASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTABANDVLSLLLASHLYCTLQAVD
                                                                                                                                                                                                                                                                                                                                                                                                                                  VSISMEKTRLALIGKLNFTQCTELLNAAMNRGLPSCLA-AEDPSLNYHGKGLDIHIAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  PTGVILSPEEAFKLAGVEGGFFELQPKEGLALVNGTAVGSGMASMVLFEANILAVLAEVM
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Conservative 133; Mismatches 271;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  27.8%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GMDFCMKTEDPLYWGIAAEAMTGSHLDEVKKMVAEYRKPVVK
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Score 1005;
Pred. No. 9.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  ).6e-59;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              PIDN:CAA57056.1; PID:g534893
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   #status
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          predicted
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Length 716;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 predicted
                                                                              -EYLTGEKVTSPGEEFDK
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  70;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   184
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          118
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       58
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     422
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       286
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          302
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         244
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            169
                                                                                                                      701
                                                                                                                                                           632
                                                                                                                                                                                                  642
                                                                                                                                                                                                                                       581
                                                                                                                                                                                                                                                                               588
                                                                                                                                                                                                                                                                                                                    524
                                                                                                                                                                                                                                                                                                                                                         541
                                                                                                                                                                                                                                                                                                                                                                                                 464
                                                                                                                                                                                                                                                                                                                                                                                                                                      481
                                                                                                                                                                                                                                                                                                                                                                                                                                                                             404
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        344
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               362
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 226
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    19
```

Search Job tim rch completed: time: 32.8797 September 9 2004, 10:08:45 5

8

Ó 밁 Ŋ 밁 Š 문 δ 뮍 Ş 밁

```
Result
No.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Post-processing: Minimum Match 0%
Maximum Match 100%
Listing first 45 summaries
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Minimum DB
Maximum DB
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Database
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Scoring table:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Sequence:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              OM protein
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Total number of
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Title:
Perfect score:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           on:
     Pred. No. is the number of results predicted by chance to have a score greater than or equal to the score of the result being printed, and is derived by analysis of the total score distribution.
     2619
2619
13346.5
1025.5
1025.5
1026.1
1020
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
1010.5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Score
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         seq length: seq length:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     protein search, using
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              %
Query
Match Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          hits satisfying chosen parameters:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            141681 segs, 52070155 residues
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              BLOSUM62
Gapop 10.0 , Gapext 0.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1 MAPSIDSLATTLANGFINGS......RIYEAIKDGRINHVLVKMLA 720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        US-09-939-408A-13
3610
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      September 9, 2004, 09:50:23;
     SwissProt_42:*
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Copyright
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               0
20000000000
     7716
7717
7717
7717
7717
7717
7717
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7718
7
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   GenCore version 5.1.6 (c) 1993 - 2004 Compugen
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 BB
                      PALY RHOTO
PALY AMAMU
PALY JAMAMU
PALY USTMA
PALLI PRUAV
PALLA ARATH
PALLI TOBAC
PALLI TOBAC
PALLI TOBAC
PALLI TOBAC
PALLI PETCR
PALLI PETCR
PALLI PETCR
PALLI PETCR
PALLI PETCR
PALLI PETCR
PALLI PETCR
PALLI PETCR
PALLI PETCR
PALLI PETCR
PALLI PETCR
PALLI PETCR
PALLI PETCR
PALLI PETCR
PALLI PETCR
PALLI PETCR
PALLI PETCR
PALLI PETCR
PALLI TOBAC
PALLI TOBAC
PALLI TOBAC
PALLI TOBAC
PALLI TOBAC
PALLI TOBAC
PALLI TOBAC
PALLI TOBAC
PALLI TOBAC
PALLI TOBAC
PALLI TOBAC
PALLI TOBAC
PALLI TOBAC
PALLI TOBAC
PALLI TOBAC
PALLI TOBAC
PALLI TOBAC
PALLI TOBAC
PALLI TOBAC
PALLI CICAR
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 H
PALY_HELAN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           sw model
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            SUMMARIES
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 23 ; Search time 16.4315 Seconds
(without alignments)
2281.620 Million cell updates/sec
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ltd.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                141681
O64963 prunus aviu
O98845 arabidopsis
P45734 trifolium
s P45729 petroselinu
P25877 nicotiana tr
P45730 populus tri
P45731 arabidopsis
O23924 digitalis i
P45726 camellia si
P45726 camellia si
P27991 glycine max
P27990 medicago sa
P24481 petroselinu
O01861 pisum sativ
P45733 nicotiana tr
P45732 stylosanthe
P1912 phaseolus v
P14717 oryza sativ
C49836 lithospermu
P26600 lycopersico
P31425 solanum tub
P35511 lycopersico
P31425 solanum tub
P35511 lycopersico
P31425 solanum tub
P35511 lycopersico
P31425 solanum sativ
P49835 lithospermu
P2660 lycopersico
P31425 solanum sativ
P3531 lycopersico
P31425 solanum sativ
P3531 lycopersico
P31425 solanum sativ
P3531 lycopersico
P31425 solanum sativ
P3531 lycopersico
P31425 solanum sativ
P3531 lycopersico
P31425 solanum sativ
P3531 lycopersico
P31425 solanum sativ
P3531 lycopersico
P31425 solanum sativ
P46881 ipomoca bat
P3531 nicotiana t
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        P35510
064963
Q98845
P45734
P45729
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Q96V77
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                P11544 rhodosporid
P10248 rhodotorula
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Description
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           ustilago ma
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      arabidopsis
prunus aviu
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       amanita mus
```

	GCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC	20000000000000000000000000000000000000	RES PALL ID AC DT DT DT DT DT DT DT DT DT DT DT DT DT	
Thibethe the the the use mod ent or car or far FIRR FIRR FIRR FIRR FIRR FIRR FIRR FIR	THE SERVICE OF THE SE	RA RED RADIO	₹ □	0 0 0 0 0 0 0 4 4 4 4 4 4 4 4 4 4 4 4 4
tween the European e Buropean e Buropean diffied and titles requesed an ensemble x51513; BL; X51513; BL; X127021; R; A29607; R; A29607; R; A29607; R; A29607; R; A5678; C; C; C; C; C; C; C; C; C; C; C; C; C;	RESQUENCE FROM N.A. CSTRAIN=IFO 0559; CSTRAIN=IFO 0559; WEDLINE=8811270; Pubw Anson J.G., Gilbert H. TOMBLE 881189-199(1987); Coding for phenylalani RL Gene 58:189-199(1987); C-!- FUNCTION: Catalyze The Contanyze to formation of the contany of th	Rhodosporidiu Rhodosporidiu Rhearyota; Fu Microbotryomy NCBI TaxID=52 [1] - TaxID=52 [1] - TaxID=52 SEQUENCE FROM SERAIN=CBS 14 MEDLINE=92127 Rasmussen 0.F "Analysis of Rhodosporidiu DNA Seq. 1:20	00000	9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9
ne ROT ne Swisi ne Swisi ne Swisi ne Swisi ne Swisi email 13/ CAA 11/ AAA 11/	OM N.A 0559; 0559; Gilbe	dium to Fungi; Fungi; =5286; =5286; 1127061; 00.F., 00 of the dium to	STAN (Rel. 1 ) (Rel. 1 ) (Rel. 4 ) (Rel. 4	227
mitry is cop  Institute Informatics It institut Institut	Bricopinos pedin	des des Spor Spor Spor Spor Spor Spor Spor Spor	F 10 0 10 D	700 710 710 720 720 700 700 710 710 710 710 710 710 710 71
ht. It is prod Bioinformatics itute. There is as long as ot removed. U ement (See htt sib.ch)	the Rhodo -lyase.", xidative do cinnamic = alanine = synthesis; asmic (Pro) 4-methylic cally by co similarity AL / histy	east) (Rhodotorulota; Urediniomyce (iobolales; Rhodos) (100)	PRT; 716 AA.  ted) sequence update) annotation update) e (BC 4.3.1.5).	PAL1 DAUCA PAL2 ORYSA PAL1 RUBID PALY CITLI PALY CITLI PALY PINTA PAL2 SOLTU PAL3 ARATH PAL1 IPOBA PAL2 POPKI PAL1 POPKI PAL3 PHAVU
anced ge	P.; idium toruloides gene idium toruloides gene lation of L- and a free ammonium ion. s-cinnamate + NH(3). st step. imidazole-5-one (MIO), zation and dehydration family.	a gracilis). tes; poridium. iia-lyase from		O23865 daucus caro p53443 oryza sativ Q9m568 rubus idaeu Q42667 citrus limo Q43210 triticum ae p52777 spinus taeda p31426 solanum tub p45725 arabidopsis P14166 ipomoea bat Q43052 populus kit p45731 populus kit p19143 phaseolus v

```
RESULT 2
PALY_RHORB
ID PALY_RHORB
AC P10248;
                                                                                          Š
                                                                                                                    밁
                                                                                                                                           δ
                                                                                                                                                                    В
                                                                                                                                                                                            Ş
                                                                                                                                                                                                                      덩
                                                                                                                                                                                                                                              Ş
                                                                                                                                                                                                                                                                              Ъ
                                                                                                                                                                                                                                                                                              Ś
                                                                                                                                                                                                                                                                                                                             В
                                                                                                                                                                                                                                                                                                                                              Š
                                                                                                                                                                                                                                                                                                                                                                         В
                                                                                                                                                                                                                                                                                                                                                                                                 Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             뫄
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ם
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Вþ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          SO SO
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Query Match
Best Local S
Matches 522
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Pfam; PF00221; PAL; 1.
TIGREAMS; TIGR01226; phe am lyase; 1.
PROSITE; PS00488; PAL HISTIDASE; 1.
Lyase; Phenylpropannid metabolism.
CROSSLNK 211 213 5-imidaz
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CONFLICT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         MOD_RES
                                                                                             716
                                                                         712
                                                                                                                            652
                                                                                                                                                   656
                                                                                                                                                                            595
                                                                                                                                                                                                    596
                                                                                                                                                                                                                              535
                                                                                                                                                                                                                                                    540
                                                                                                                                                                                                                                                                              475
                                                                                                                                                                                                                                                                                                      480
                                                                                                                                                                                                                                                                                                                              415
                                                                                                                                                                                                                                                                                                                                                       420
                                                                                                                                                                                                                                                                                                                                                                                 355
                                                                                                                                                                                                                                                                                                                                                                                                        361
                                                                                                                                                                                                                                                                                                                                                                                                                                 295
                                                                                                                                                                                                                                                                                                                                                                                                                                                         301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 235
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    175
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      115
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          522;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       <u>ს</u>
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 μ.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Similarity
                                                                                                 VKMLA
                                                                                                                            SPALSYLSPRTQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNVL
                                                                                                                                           APAHAYLSPRTRVLYSFVREELGVQARRGDVFVGVQQETIGSNVSRIYEAIKDGRINHVL
                                                                                                                                                                           PRWHDAFSFAAGTVVEVLSST---SLSLAAVNAWKVAAAESAISLTRQVRETFWSAASTS
                                                                                                                                                                                              PRWHDAFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAISLTREVRNRFWQTPSSQ
                                                                                                                                                                                                                                                                                           AAYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQA
                                                                                                                                                                                                                                                                                                                                              ASAVSISMEKTRLALALIGKLNFTQCTELLNAAMNRGLPSCLAAEDPSLNYHGKGLDIHI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                VLHEGTEKIMFAREAISLFGLEAVVLGPKEGLGLVNGTAVSASMATLSLHDSHMLSLLSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   SLTRGHSAVRLVVLEALTNFLNHGITFIVPLRGTISASGDLSFLSYIAAAISGHPDSKVH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   SLTRGHSAVRLVVLEALTNFLNHRITFIVPLRGSISASGDLSPLSYIAGAITGHPDVXVH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            GFGGSADTRTEDAVSLOKALIEHQLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIRVN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   PTDDVVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSVYGVTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   MAPSIDSLATTLANGFTNGSHAAPTKSAAGPTSALRRTPGLDGHAAHQSQLEIVQELLSD
                                                                                                                                                                                                                              IDLRAIEFEFKKQFGPAIVSLIDQHFGSAMTGSNLRDELVEKVNKTLAKRLEQTNSYDLV
                                                                                                                                                                                                                                                   VDLRAMELDFKKQFDPLLPTLLQQHLG---TGLDV-NALALEVKKALNKRLEQTTTYDLE
                                                                                                                                                                                                                                                                            AAYTSELGHLANPVTTHVQPAEMANQAVNSLALISARRTTESNDVLSLLLATHLYCVLQA
                                                                                                                                                                                                                                                                                                                              AAAVANTMEKTRLGLAQIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIAA
                                                                                                                                                                                                                                                                                                                                                                               EGILRODRYPLRTSPOWLGPLVSDLIHAHAVLTIEAGOSTTDNPLIDVENKTSHHGGNFO
                                                                                                                                                                                                                                                                                                                                                                                                     EGILRODRYPLRTSPOFTGPLVEDMMHAYSTLSLE-NNTTTDNPLLDVENKOTAHGGNFO
                                                                                                                                                                                                                                                                                                                                                                                                                                SLTAMTVEAMVGHAGSFHPFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEVXVKDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                        ALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 VVHEGKEKILYAREAMALFNLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      GFGGSADTRTEDAISLQKALLEHQLCGVLPSSFDSFRLGRGLENSLPLEVVRGAMTIRVN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      PTDSTLELDGYSLNLGDVVSAARKGREVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       MAPSLDSISHSFANG-----VASAKQAVNGASTNLAVAGSHLPTTQVTQVDIVEKMLAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            212
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  4
                                                                                                   720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Ã,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            212
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          76879
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  37
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     72.4%;
72.0%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Z.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         86;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Score 2614; Di
Pred. No. 2.4e
6; Mismatches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        (By similarity).

DHA (2,3-DIDEHYDROALANINE)
(BY SIMILARITY).

SLDSISHSFANGVAGAKQAVNGASTNLAVAGSHL
RPTSQSQARTC (IN REF. 2).

OCLDF61769A4E5E6 CRC64;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 5-imidazolinone (Ala-Gly)
              PRT;
             713
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   DB 1;
.4e-167;
              ξ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Gaps
                                                                                                                                                                                                                                                                                                                               474
                                                                                                                            711
                                                                                                                                                                            651
                                                                                                                                                                                                    655
                                                                                                                                                                                                                              594
                                                                                                                                                                                                                                                      595
                                                                                                                                                                                                                                                                              534
                                                                                                                                                                                                                                                                                                      539
                                                                                                                                                                                                                                                                                                                                                       479
                                                                                                                                                                                                                                                                                                                                                                               414
                                                                                                                                                                                                                                                                                                                                                                                                        419
                                                                                                                                                                                                                                                                                                                                                                                                                                 354
                                                                                                                                                                                                                                                                                                                                                                                                                                                         360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 294
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   234
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      174
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            180
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              120
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       54
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 60
```

```
Ś
                                                                                                                                          밁
Ś
                                               片
                                                                                                                                                                                  Ś
                                                                                                                                                                                                                                                                                                                                    FFFBBQ005058BBBSAGEFFBBSAGEFFAGOOOOOOOOOOOOOOOOO
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             RA Filpula D., Strausberg R.L., Vaslet C.A., Sykes A., Levy A.;

RRA Filpula D., Strausberg R.L., Vaslet C.A., Sykes A., Levy A.;

RRA Filpula D., Strausberg R.L., Vaslet C.A., Sykes A., Levy A.;

RRA Filpula D., Strausberg R.L., Vaslet C.A., Sykes A., Levy A.;

RRA Filpula D., Strausberg R.L., Vaslet C.A., Sykes A., Levy A.;

Results of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control
                                                                                                                                                                                                                                       Query Match
Best Local S
Matches 511
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          01-MAR-1989
01-JAN-1990
10-OCT-2003
                                                                                                                                                                                                                                                                                                                                                                                                TIGREAMS; TIGRO1225; Puc_wm__1; 1.
PROSITE; PS00488; PAL HISTIDASE; 1.
Lyase; Phenylpropanoid metabolism.
5-imidazolinone (Ala-Gly)
CROSSLNK 217 219 (Bv similarity).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             This SWISS-PROT entry is copyright. It is produced through a collaboration between the Swiss Institute of Bioinformatics and the EMBL outstation - the European Bioinformatics Institute. There are no restrictions on its use by non-profit institutions as long as its content is in no way modified and this statement is not removed. Usage by and for commercial entities requires a license agreement (See http://www.isb-sib.ch/announce/or send an email to license@isb-sib.ch).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  SEQUENCE FROM N.A.
STRAIN-NRRL Y-15597;
MEDLINE-89083582; PubMed-3205749;
Filpula D., Strausberg R.L., Vaslet C.A., Sykes.
"Nucleotide sequence of gene for phenylalanine an
Rhodotorula rubra.";
Nucleic Acids Res. 16:11381-11381(1988).
                                                                                                                                                                                                                                                                                                                                                                         MOD_RES
                                                                                                                                                                                                                                                                                                                                    SEQUENCE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  InterPro; IPR008948; L-Aspartase-like.
InterPro; IPR008106; Phe/His NH3lyase.
InterPro; IPR005922; Phe_am_lyase.
Pfam; PF00221; PAL; 1.
TIGRFAMS; TIGR01226; phe_am_lyase; 1.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           HSSP;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          EMBL; X13094; CAA31486.1; -. PIR; S01999; S01999.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     STRAIN=NRRL Y-15597;
MEDLINE=89083583; PubMed=3205750;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Rhodotorula rubra (Yeast) (Rhodotorula mucilaginosa).
Bukaryota; Fungi; Basidiomycota; Urediniomycetes;
Microbotryomycetidae; Sporidiobolales; mitosporic Spo
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       DETAILS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            NCBI_TaxID=5537;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Phenylalanine
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Rhodotorula
                                                                                                                                                                                                                                         511;
                                                  53
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      P21310; 1B8F
                                                                                          54
                                                                                                                                                                                         ы
                                                                                                                                                                                                                                                                Similarity
                                                                        MAPSIDSIATTIANGFTNGSHAAPT-----KSAAGPTSALRRTPGIDGHAAHQSQLEI
  NSVYGVTTGFGGSADTRTEDAVSLQKALIEHQLCGVTPTSXSSFSVGRGLENTLPLEVVR
                                                                                                                                               MAPSVDSIATSVANSLSNGLHAAAAANGGDVHKKTAGAGSLLPTT
                                                                                                                                                                                                                                                                                                                                    713
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 (Rel. 10, Created)
(Rel. 13, Last sequence up
(Rel. 42, Last annotation
ne ammonia-lyase (EC 4.3.1.
                                                                                                                                                                                                                                         Conservative
                                                                                                                                                                                                                                                                                                                                                                                   218
                                                                                                                                                                                                                                                                                                                                    ÃĄ,
                                                                                                                                                                                                                                                                                                                                                                                   218
                                                                                                                                                                                                                                                                                                                                    76000 MW;
                                                                                                                                                                                                                                                      69.2%;
                                                                                                                                                                                                                                    ; Score 2499.5; DB 1; pred. No. 1.1e-159; 83; Mismatches 105;
                                                                                                                                                                                                                                                                                                                                                          (By similarity).
DHA (2,3-DIDEHYDROALANINE)
(BY SIMILARITY).
                                                                                                                                                                                                                                                                                                                                    6EB8317CBB037D88 CRC64;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      update)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         update)
                                                                                                                                                                                                                                                                                      μ.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ammonia-lyase
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Α.,
                                                                                                                                                                                                                                         Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Sporidiobolales;
                                                                                                                                                                                                                                                                                    Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Levy A.;
                                                                                                                                                                                                                                                                                         713;
                                                                                                                                                                                                                                         35,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       from
                                                                                                                                                                                                                                         Gaps
                                                                                                                                               52
                                                                                                                                                                                              53
          172
```

```
PALY AMANU
ID PALY A
CO93967
DT 10-OCT
DT 10-OCT
DT 10-OCT
DT 10-OCT
DT SHARY
OC AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMANIT
GN PAL.
OS AMA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ŗ,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ď,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            멼
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ŗ,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               PALY_AMAMU STANDLE CONTROL OF THE PALY AMAMU STANDLE CONTROL OF THE PALY A
                            P. SEQUENCE FROM N.A.

Nehls U., Mikolajewski S., Ecke M., Hampp R.;

Nehls U., Mikolajewski S., Ecke M., Hampp R.;

Nehls U., Mikolajewski S., Ecke M., Hampp R.;

Nehls U., Mikolajewski S., Ecke M., Hampp R.;

Nehls U., Mikolajewski S., Ecke M., Hampp R.;

Preside G., Mikolajewski S., Ecke M., Hampp R.;

Submitted (AUG-1998) to the EMBL/GenBank/DBJ databases.

Submitted (AUG-1998) to the EMBL/GenBank/DBJ databases.

Submitted (AUG-1998) to the EMBL/GenBank/DBJ databases.

C. -!- FUNCTION: Catalyzes the nonoxidative deamination of L-

phenylalanine to form trans-cinnamic acid and a free ammonium ion.

C. -!- FUNCTION: CATIVITY: L-phenylalanine = trans-cinnamate + NH(3).

C. -!- SUBCELLULAR LOCATION: Cytoplasmic (Probable).

C. -!- SUBCELLULAR LOCATION: Cytoplasmic (Probable).

C. -!- SUBCELLULAR LOCATION: Cytoplasmic (Probable).

C. -!- PTM: Contains an active site 4-methylidene-imidazole-5-one (MIO),

of residues Ser-Ser-Gly (By similarity).

C. -!- SIMILARITY: Belongs to the PAL / histidase family.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Eukaryota; Fungi; Basidiomycota; Agaricales; Amanitaceae; Amanita. NCBI TaxID=41956;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            700
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 707
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         640
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      647
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   583
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         529
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 532
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          469
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       472
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                409
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        412
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     349
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              353
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       289
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    293
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                233
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     233
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           173
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    113
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              RFWQTPSSQAPAHAYLSPRTRVLYSFVREELGVQARRGDVFVGVQQETIGSNVSRIYEAI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           GKGLDIHIAAYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLAS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        TAHGGNFQASAVSISMEKTRLALALIGKLNFTQCTELLNAAMNRGLPSCLAAEDPSLNYH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          EEVKVKDDEGILRODRYPLRTSPOFLGPLVEDMMHAYSTLSLE-NNTTTDNPLLDVENKO
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           HMLSLLSQALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            GHPDSKVHV--DG--KIMSAQEAIALKGLQPVVLGPKEGLGLVNGTAVSASMATLALTDA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             GHPDVKVHVLHEGTEKIMFAREAISLFGLEAVVLGPKEGLGLVNGTAVSASMATLSLHDS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GAMVIRVNSLTRGHSAVRLVVLEALTNFLNHRITPIVPLRGSISASGDLSPLSYIAGAIT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    KSGCIAPVLVKMMA 713
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        KDGRINHVLVKMLA 720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             SFWAAPSSSSPALKYLSPRTRVLYSFVREEVGVKARRGDVYLGKQEVTIGTNVSRIYEAI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               QQNNSYDLEQRWHDTFSVATGAVVEALAGQ----EVSLASLNAWKVACAEKAIALTRSVRD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            EQTTTYDLEPRWHDAFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAISLTREVRN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     HLYCVLQAVDLRAMEFEHTKAFEPMVTELLKQHFG-----ALATAEVEDKVRKSIYKRL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             HLYCTLQAVDLRAMELDFKKQFDFLLFTLLQQHLGTGLDVNALAL----EVKKALNKRL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CKGLDI AAAAYTSELGHLANDVSTHVQDAEMGNQAINSLALISARRTAEANDVLSLLLAT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            THHGGAFMASSVGNTMEKTRLAVALMGKVSFTQLTEMLNAGMNRALPSCLAAEDPSLSYH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     TEVKVKDDEGILRODRYPLRCSPOWLGPLVSDMIHAHAVLSLEAGOSTIDNPLIDLENKM
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       HVLSLLAQALTALTVEAMVGHAGSFHPFLHDVTRPHPTQIEVARNIRTLLEGSKYAVHHE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GAMTIRVNSLTRGHSAVRIVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAASIT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Basidiomycota; Hymenomycetes; Homobasidiomycetes;
                                                                                                                                                                                                                                                                                                               g
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     408
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 99
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      706
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   639
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            646
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              528
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   531
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    468
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        471
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              411
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           348
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                288
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     292
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           232
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    172
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             γQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ń
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             맑
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         맑
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ş
                                                                                                                     밁
                                                                                                                                                                                 Š
                                                                                                                                                                                                                                                                          ₽
                                                                                                                                                                                                                                                                                                                                               Š
                                                                                                                                                                                                                                                                                                                                                                                                                            B
```

```
Query Match
Best Local S
Matches 317
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        EMBL; AJ010143; CAA09013.1; -

HSSP; P21310; 1BBF;
InterPro; IPR008948; L-Aspartase-like.
InterPro; IPR001106; Phe/His_NH31yase.
InterPro; IPR001106; Phe/His_NH31yase.
InterPro; IPR001222; Phe_am_lyase.
Pfam; PP00221; PAL; 1.

FFAm; PP00221; PAL; 1.

PROSITE; PS00488; PAL HSTIDASE; 1.

PROSITE; PS00488; PAL HSTIDASE; 1.

PROSITE; PS00488; PAL HSTIDASE; 1.

PROSITE; PS00488; PAL HSTIDASE; 1.

PROSITE; PS00488; PAL HSTIDASE; 1.

PROSITE; PS00488; PAL HSTIDASE; 1.

PROSITE; PS00488; PAL HSTIDASE; 1.

PROSITE; PS00488; PAL HSTIDASE; 1.

PROSITE; PS00488; PAL HSTIDASE; 1.

PROSITE; PS00488; PAL HSTIDASE; 1.

PROSITE; PS00488; PAL HSTIDASE; 1.

PROSITE; PS00488; PAL HSTIDASE; 1.

PROSITE; PS00488; PAL HSTIDASE; 1.

PROSITE; PS00488; PAL HSTIDASE; 1.

PROSITE; PS00488; PAL HSTIDASE; 1.

PROSITE; PS00488; PAL HSTIDASE; 1.

PROSITE; PS00488; PAL HSTIDASE; 1.

PROSITE; PS00488; PAL HSTIDASE; 1.

PROSITE; PS00488; PAL HSTIDASE; 1.

PROSITE; PS00488; PAL HSTIDASE; 1.

PROSITE; PS00488; PAL HSTIDASE; 1.

PROSITE; PS00488; PAL HSTIDASE; 1.

PROSITE; PS00488; PAL HSTIDASE; 1.

PROSITE; PS00488; PAL HSTIDASE; 1.

PROSITE; PS00488; PAL HSTIDASE; 1.

PROSITE; PS00488; PAL HSTIDASE; 1.

PROSITE; PS00488; PAL HSTIDASE; 1.

PROSITE; PS00488; PAL HSTIDASE; 1.

PROSITE; PS00488; PAL HSTIDASE; 1.

PROSITE; PS00488; PAL HSTIDASE; 1.

PROSITE; PS00488; PAL HSTIDASE; 1.

PROSITE; PS00488; PAL HSTIDASE; 1.

PROSITE; PS00488; PAL HSTIDASE; 1.

PROSITE; PS00488; PAL HSTIDASE; 1.

PROSITE; PS00488; PAL HSTIDASE; 1.

PROSITE; PS00488; PAL HSTIDASE; 1.

PROSITE; PS00488; PAL HSTIDASE; 1.

PROSITE; PS00488; PAL HSTIDASE; 1.

PROSITE; PS00488; PAL HSTIDASE; 1.

PROSITE; PS00488; PAL HSTIDASE; 1.

PROSITE; PS00488; PAL HSTIDASE; 1.

PROSITE; PS00488; PAL HSTIDASE; 1.

PROSITE; PS00488; PAL HSTIDASE; 1.

PROSITE; PS00488; PAL HSTIDASE; 1.

PROSITE; PS00488; PAL HSTIDASE; 1.

PROSITE; PS00488; PAL HSTIDASE; 1.

PROSITE; PS00488; PAL HSTIDASE; PAL HSTIDASE; PAL HSTIDASE; PAL HSTIDASE; PAL HSTIDASE; PAL HSTIDASE; PAL HSTIDASE; PAL HSTIDASE; PAL HSTID
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   This SWISS-PROT entry is copyright. It is produced through a collaboration between the Swiss Institute of Bioinformatics and the EMBL outstation - the European Bioinformatics Institute. There are no restrictions on its use by non-profit institutions as long as its content is in no way modified and this statement is not removed. Usage by and for commercial entities requires a license agreement (See http://www.isb-sib.ch/announce/or send an email to license@isb-sib.ch).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     SEQUENCE
                                648
                                                                                                                                                                                                                                                                                                                                       487
                                                                                                                                                                                                                                                                                                                                                                                                 476
                                                                                                                                                                                                                                                                                                                                                                                                                                                           427
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     367
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              358
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        307
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     298
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         189
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   182
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             129
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              317;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   69
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             67
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          25
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 10
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Similarity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            LTRGHSAVRLVVLEALTNFLNHRITFIVPLRGSISASGDLSPLSYIAGAITGHPDVKVHV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 TTLANGF--TNGSHAAPTKSAAGPTSALRRTPGLDGHAAHQSQ-LEIVQELLSDPTDDVV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       FWQTPSSQAPAHAYLSPRTRVLYSFVREELGVQARRGDVF-----VGVQQETIGSNVSR
                                                                                                                                                                                                                                                                       TLQAVDLRAMELDFKKQFDFLLPTLLQQHLGTGL---DVNALALEVKKALNKRLEQTTTY
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        GNFQASAVSISMEKTRLALALIGKLNFTQCTELLNAAMNRGLPSCLAAEDPSLNYHGKGL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        KDDEGILRQDRYPLRTSPQFLGPLVEDMMHAYSTLSLENN--TTTDNPLLDVENKQTAHG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               LSQALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEBEVKV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         LH----EGTEKIMFAREAISLFGLEAVVLGPKEGLGLVNGTAVSASMATLSLHDSHMLSL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      SADTRTDKPMLLGFALLQHQHVGILPTSTEPLDVLPLQDANNTSMPEAWIRGAILIRMNS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             SADTRTEDAVSLQKALIEHQLCGVTPTSXSSFSV--GRGLENT-LPLEVVRGAMVIRVNS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                KVDGQTLSIAAVAAAARYNAAVELDESPLVKERVRKSQLAIANKVSTGASVYGLSTGFGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          ELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFL--KAQLQNSVYGVTTGFGG
                                                                                      DNTDRMTTMAATSSSVLLQFFTDSGASVPPSSCDLLSSVSSFQSSVÅTRSSVLMDDLRKE
                                                                                                                                                   DLEPRWHDAFSYATGTVVELLSSS-----PSANVTLTAVNAWKVASAEKAISLTREVRNR
                                                                                                                                                                                                                   LCÓALDLRALOREFLPGLDIIIREELRSSFGSFLSSEQMEKLQQNLTSAFEDHLDKTTTM
                                                                                                                                                                                                                                                                                                                                 DIHIAAYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYC
                                                                                                                                                                                                                                                                                                                                                                                                                                                              GNFQAMAVTNAMEKTRIALHHVGKILFSQSTELVNPAMNRGLPPSVAATDPSLNYHAKGI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     EDDKYTLRODKYPLRTSPOFLGPQIEDIISAFQTVTQECNYLPATDNPLIDGETGESHHG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        LAQVCTAMGTEALIGTRASHAPFIHATARPHPGQVECAENIWNLLDGSKLAQLEEHEVRL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               -HGPSKSGTRQIGSSKDVLALHNIEDFPLESKEPLGTLNGTAFSASVAALALNEAIHLVL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     740 AA;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Conservative 131; Mismatches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     80156 MW;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              43.0%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        37.3%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Score 1346.5; D
Pred. No. 2e-82;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        B055CFF3D8B7BCEE CRC64;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           DB 1;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           740;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              51;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   a collaboration
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   241
                                                                                             662
                                                                                                                                                                                                                                                                                                                                             542
                                                                                                                                                                                                                                                                                                                                                                                                    535
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       128
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          83
                                   701
                                                                                                                                                                                                                       602
                                                                                                                                                                                                                                                                                592
                                                                                                                                                                                                                                                                                                                                                                                                                                                                 486
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              475
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        426
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  415
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               366
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            357
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     306
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  297
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            247
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                188
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             124
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       9
```

뮍 Ş 밁

294

```
RESULT OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE 
                                                                                                                                                                                                                                     Query Match
Best Local S
Matches 302
                                                                                                                                                                                                                                                                                                                                                                                                    EMBL; AF306551; AAL09388.1; -.
InterPro; IPR008948; L-Aspartase-like.
InterPro; IPR001106; Phe/His NH31yase.
InterPro; IPR0015922; Phe_am_lyase.
Pfam; PF00221; PAL; 1.
TIGRPAMS; TIGR01226; Phe_am_lyase; 1.
PROSITE; PS00488; PAL_HISTIDASE; 1.
PROSITE; PS00488; PAL_HISTIDASE; 1.
Lyase; Phenylpropamoid metabolism.
CROSSLNK 205 5-imidazoli
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             _USTMA
_PALY_USTMA
Q96V77;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 between
the Euro
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Kim S.-H., N
Ellis B.E.;
                                                                                                                                                                                                                                                                                                                                                                 g
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             entities requires a license agreement (S or send an email to license@isb-sib.ch).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              This
                                                                                                                                                                                                                                                                                                                       SEQUENCE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       modified and
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Submitted
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ustilaginomycetidae;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         -
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ustilago maydis."
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  SEQUENCE FROM
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Eukaryota;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ustilago maydis
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Phenylalanine
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 10-OCT-2003 (Rel.
10-OCT-2003 (Rel.
10-OCT-2003 (Rel.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                'Cloning and disruption of a phenylalanine ammonia-lyase
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          mitted (SSP-2000) to the EMBL/GenBank/DDBJ databases.

FUNCTION: Catalyzes the nonoxidative deamination of L-
phenylalanine to form trans-cinnamic acid and a free ammonium ior
phenylalanine to form trans-cinnamic acid and a free ammonium ior
CATALYTIC ACTIVITY: L-phenylalanine = trans-cinnamate + NH(3).

PATHWAY: Phenylpropanoid biosynthesis; first step.

PATHWAY: Phenylpropanoid biosynthesis; first step.

SUBCELIULAR LOCATION: Cytoplasmic (Probable).

PTM: Contains an active site 4-methylidene-imidazole-5-one (MIO),
which is formed autocatalytically by cyclization and dehydration
of residues Ala-Ser-Gly (By similarity).

SIMILARITY: Belongs to the PAL / histidase family.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    European
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     SWISS-PROT entry is copyright. It is produced through a collable en the Swiss Institute of Bioinformatics and the EMBL outest Buropean Bioinformatics Institute. There are no restrictions by non-profit institutions as long as its content is in fied and this statement is not removed. Usage by and for confided and this statement is not removed.
                            130
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 702
                                                                      45
                                                                                                                                                                                                                                     al Similarity
302; Conser
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         722
                                                                                                            72
                                                                                                                                                                                              23
                                                                                                                                                      N
    TEDAVSLQKALIEHQLCGVTPTSXSSFSVGR----
                                                                    NLKIQGLVASARYGHVTRPRPSAETRKRIDDSVQSLIAKLDGGESIYGINTGFGGSADSR
                                                                                                          SLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQ--NSVYGVTTGFGGSADTR
                                                                                                                                                                                           APTKSAAGPTSALRRTPGLDGHAAHQSQLEIVQELLSDPTD------DVVELSGY
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         TYESTROCKMOSTIVSL 738
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 IYEAIKDGRINHVLVKM
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      YIFGDRGPTPASQYIG-KTRPVYQFIRTTIGVRKHGSENYNKFYNGLGVEDVTIGQNISR
                                                                                                                                                                                                                                                                                                                     724
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Macdonald
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Fungi;
                                                                                                                                                                                                                                     Conservative
                                                                                                                                                                                                                                                                                                                                                                 206
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  N.A.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                ammonia-lyase
                                                                                                                                                                                                                                                                                                                     A.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       (Smut fungus).
i; Basidiomycota; Ustidae; Ustilaginales;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     STANDARD;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 442,
                                                                                                                                                                                                                                                                                                                                                                 206
                                                                                                                                                                                                                                                                                                                       79277
                                                                                                                                                                                                                                   34.6%; Sc
40.8%; Pr
tive 130;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          .
.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Last sequence update)
Last annotation update)
-lyase (EC 4.3.1.5)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Virmani
                                                                                                                                                                                                                                                                                                                       MW.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   718
                                                                                                                                                                                                                                   Score 1247.5; I
Pred. No. 8.1e-7
30; Mismatches 2
                                                                                                                                                                                                                                                                                                                                         (By similarity).

DHA (2,3-DIDEHYDROALANINE)

(BY SIMILARITY).
                                                                                                                                                                                                                                                                                                                                                                                                       5-imidazolinone (Ala-Gly)
                                                                                                                                                                                                                                                                                                                       02A73C97C34CD1AB
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        ,
D
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ustilaginomycetes;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Ustilaginaceae;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Wake
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   724
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   (See http://www.isb-sib.ch/announce/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ä
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        .×
;
    ----GLENT----
                                                                                                                                                      LLVQPSDTKLRKASSFRTEQVVIDGY
                                                                                                                                                                                                                                                           DB
-76;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Kronstad
                                                                                                                                                                                                                                                                           1;
                                                                                                                                                                                                                                                                                                                       CRC64;
                                                                                                                                                                                                                                     Indels
                                                                                                                                                                                                                                                                           Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ustilago
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                gene
    -LPLEVVRGAMV
                                                                                                                                                                                                                                     65;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         collaboration
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       outstation
                                                                                                                                                                                                                                     Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          commercial
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ton
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             90
                                                                                                                                                    44
                                                                    104
                                                                                                            129
        RESULT
PAL1_AR
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             뮹
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             문
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                ద
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 맔
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            LT 5
_ARATH
STRAIN=cv. Columbia;
MEDLINE=20083487; PubMed=10617197;
Lin X., Kaul S., Rounsley S.D., Shea T.P., Benito M.-I
Fujii C.Y., Mason T.M., Bowman C.L., Barnstead M.E., F
Buell C.R., Ketchum K.A., Lee J.J., Ronning C.M., Koo
Moffat K.S., Cronin L.A., Shen M., Pai G., Van Aken S.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                PALL ARATH STANDARD; PRT; 725 AA. P35510; Q9ZQD6; 01-UN-1994 (Rel. 29, Created) 01-NOV-1995 (Rel. 32, Last sequence update) 10-OCT-2003 (Rel. 42, Last annotation update) Phenylalanine ammonia-lyase 1 (EC 4.3.1.5).
                                                                                                                                                                                         SEQUENCE FROM N.A.
STRAIR-CV. Landsberg erecta;
MEDLINE-95195160; PubMed-7888622;
Wanner L.A., Li G., Ware D., Soms
"The phenylalanine ammonia-lyase;
thaliana.";
                                                                                                                                                                                                                                                                                                                                                          PALI OR ATZG37040 OR TIJ8.22.
Arabidopsis thallana (Mouse-ear cress).
Bukaryota; Viridiplantae; Streptophyta; Embryophyta; Tracheophyta;
Spermatophyta; Magnollophyta; eudicotyledons; core eudicots; rosid
eurosids II; Brassicales; Brassicaceae; Arabidopsis.
                                                                                                                                SEQUENCE FROM N.A.
                                                                                                                                                                                                                                                                                                                                         NCBI_TaxID=3702;
                                                                                                                                                                          lant
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       699
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               644
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     645
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 584
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       587
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                524
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        530
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                464
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          470
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    404
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          411
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      344
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           353
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             701
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     284
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               295
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     224
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         164
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        105
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           VSVIYASIRDGELYNMLSEL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                FHAKGINIALASVTSELMFLGNPVSTHVQSAEMANQAFNSLALISGRQTLQAIECLSMIQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     VSRIYEAIKDGRINHVLVKM
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               TIEFLDNPYA---CHASHLIGKTKRAYEFVRKTLGVPMHGKENLNEFKGEFEOWNTTGGY
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     RNRFWQTPSSQAPAHA-YLSPRTRVLYSFVREELGVQARRGD---VFVG--VQQETIGSN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       EQTTTYDLEPRWHDAFSYATGTVVELLSSSPSANVT--LTAVNAWKVASAEKAISLTREV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                AWSLYLLCQALDIRALQYKVAEQLPTLILASLHSHFGEWMDETKQQEIAAQVLKSMSKRL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        YHGKGLDIHIAAYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    RIHHGGNFOAMAMTNAVEKIRLALCAMGKMTFOOMTELVNPAMNRGLPANLASTPOLSLN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          QTAHGGNEQASAVSISMEKTRLALALIGKLNETQCTELLNAAMNRGLPSCLAA-EDPSLN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              EEVXVKDDEGILRQDRYPLRTSPQFLGPLVEDMMHAYSTLSLENNTTTDNPLLDV--ENK
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           LSLLSQALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFA--VEHE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 DETSSKDLRDRLVETYQDASSVLVRYFSELPSGGGADPLRNIVKWRATGVADTEKIYRQV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      ASHLYCTLQAVDLRAMELDFKKQFDFLLFTLLQQHLGTGLD---VNALALEVKKALNKRL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 KHVLFSEDNGTLRQDRYTLQTASQWVGPGLEDIENAKRSVDFBINSTTDNPMIDPYDGDG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     LASLTQLTTAMAVEALKGTDASFAPFIHEIARPHPGQIKSAKFIRAHLSGSRLAEHLENE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       GIYCFVTDGRGQRVKVTADEACRMHKITPVQYEPKEALGLLNGTAFSASVAGLATYEAEN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          DVKVHVLHEGTEKI-MFAREAISLFGLEAVVLGPKEGLGLVNGTAVSASMATLSLHDSHM
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         VRLSSLMRGHSGVRWEVLDKMQKLFLQNNVTPVVPVRSSISASGDLSPLSYVAGALAGQR
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              IRVNSLTRGHSAVRLVVLEALTN-FLNHRITPIVPLRGSISASGDLSPLSYIAGAITGHP
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        TANTRALQLALLQMQQCGVLPVP-STFPTGEPSSAPFALPLTDTESSLIMPEAWVRGAIV
                                                                                                                                                                          Biol.
                                                                                                                                                                          27:327-338(1995)
                                                                                                                                                                                                               Somssich
yase gene
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       718
                                                                                                                                                                                                                 : family
    , Benito M.-I., iv... Tistead M.E., Feldblyum T
                                                                                                                                                                                                                                     Davis K.R.
                                                                                                                                                                                                                    in Arabidopsis
                                                                      C
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         869
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 643
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       644
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                583
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          529
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    463
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            469
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      403
```

70C

Ş B Ś DЬ 100

```
밁
                                                                                                                         B,
                                                                                                                                                        Ş
                                                                                                                                                                                            Ď,
                                                                                                                                                                                                                           Ş
                                                                                                                                                                                                                                                                                                                                    Ś
                                                                                   Ś
                                                                                                                                                                                                                                                               Query Match
Best Local Sim
Matches 271;
                                                                                                                                                                                                                                                                                                                                 CONFLICT
CONFLICT
CONFLICT
SEQUENCE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   EMBL; AC006922; AAM15324.1; -.
EMBL; X62747, CAA44609.1; -.
PIR; S52990; S52990.
HSSP; P21310, 1B8F.
InterPro; IP8008948; L-Aspartase-like.
InterPro; IP8001106; Phe/His NH31yase.
InterPro; IP8005922; Phe_am_Tyase.
DFam. DF00721. DRI. 1
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             the European Bioinformatics Institute. There are no restrictions on use by non-profit institutions as long as its content is in no modified and this statement is not removed. Usage by and for commer entitles requires a license agreement (See http://www.isb-sib.ch/annou or send an email to license@isb-sib.ch).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  -!- FUNCTION: This is a key enzyme of plant metabolism catalyzing the first reaction in the biosynthesis from L-phenylalanine of a wide variety of natural products based on the phenylpropane skeleton.

-!- CATALYTIC ACTIVITY: L-phenylalanine = trans-cinnamate + NH(3).

-!- PATHMAY: Phenylpropanoid biosynthesis; first step.
-!- SUBCELULUAR ICACATION: Cytoplasmic (Probable).
-!- PTM: Contains an active site 4-methylidene-imidazole-5-one (MIO), which is formed autocatalyzically by cyclization and dehydration of residues Ala-Ser-Gly (By similarity).
-!- SIMILARITY: Belongs to the PAL / histidase family.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           STRAIN=cv. Columbia;
MEDLINE=93005677; PubMed=2152131;
Ohl S., Hedrick S.A., Chory J., Lamb C.J.;
"Functional properties of a phenylalanine ammonia-lyase promoter from Arabidopsis.";
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 This SWISS-PROT entry is copyright. It is produced through between the Swiss Institute of Bioinformatics and the E
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Tallon L.J., Gill J.E., Adams M.D., Carrera A.J., Creasy T.H., Goodman H.M., Somerville C.R., Copenhaver G.P., Preuss D., Nierman W.C., White O., Eisen J.A., Salzberg S.L., Fraser C.M., Venter J.C.,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                EMBL; L33677; AAC18870.1; -.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Plant
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    SEQUENCE OF 1-240 FROM N.A.
                                                                                                                                                                                                                                                                                                                                                                                                                    MOD_RES
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    "Sequence and analysis of chromosome 2 of the plant Arabidopsis
                                                                                                                                                                                                                                                                                                                                                                                                                                                                    IGRFAMs; TIGRO1226; phe am lyase; 1.
ROSITE; PSO0488; PAL HISTIDASE; 1.
Yase; Phenylpropanoid metabolism; Mu
                                                                                        119
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            PF00221; PAL;
                                                                                                                                                                                                                             18
                                                                                                                           60
                                                                                                                                                          61
                                                                                                                                                                                                                                                                                  Similarity
                     VNSLTRGHSAVRLVVLEALTNFLNHRITPIVPLRGSISASGDLSPLSYIAGAITGHPDVK
                                                                                                                                                                                                                             NGSHAAPTKSAAGPTSAL--------RRTPGLDGHAAHQ---SQLEIVQELLSD
                                                      TTGFGATSHRRTKNGVALQKELIRFLNAGI-----FGSTKETSHTLPHSATRAAMLVR
                                                                                       TTGFGGSADTRTEDAVSLQKALIEHQLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIR
                                                                                                                           FRKPVVNLGGETLTIGQVAAISTIGNSVKVELSETARAGVNASSDWVMESMNKGTDSYGV
                                                                                                                                                          PIDDVVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSV--YGV 118
                                                                                                                                                                                            NGAH----KSNGGGVDAMLCGGDIKTKNMVINAEDPLNWGAAAEQMKGSHLDEVKRMVAE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                2:837-848(1990).
                                                                                                                                                                                                                                                                                                                                   725
                                                                                                                                                                                                                                                                 Conservative
                                                                                                                                                                                                                                                                                                                                   ΑA;
                                                                                                                                                                                                                                                                                                                                 329 V
426 R
612 V
78782 MW;
                                                                                                                                                                                                                                                                                                                                                                                                                    212
                                                                                                                                                                                                                                                                                  28.7%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                   HISTIDASE; 1.
metabolism; Multigene family.
5-imidazolinone (Ala-Gly)
138;
                                                                                                                                                                                                                                                              Score 1035.5; DB 1;
Pred. No. 1.3e-61;
8; Mismatches 259;
                                                                                                                                                                                                                                                                                                                                                 DHA (2,3-
(BY SIMIL
V -> I (I
R -> A (I
V -> I (I
                                                                                                                                                                                                                                                                                                                                                                                                                                       (By similarity
                                                                                                                                                                                                                                                                                                                                   5D65F102D50A2946 CRC64;
                                                                                                                                                                                                                                                                                                                                                   I (IN REF. 2).
A (IN REF. 2).
I (IN REF. 2).
                                                                                                                                                                                                                                                                                                                                                                                                                    (2,3-DIDEHYDROALANINE)
                                                                                                                                                                                                                                                                                                                                                                                                    LARITY).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   (See http://www.isb-sib.ch/announce/
                                                                                                                                                                                                                                                                 Indels
                                                                                                                                                                                                                                                                                              Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        EMBL outstation
                                                                                                                                                                                                                                                              77;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       a collaboration
                                                                                                                                                                                                                                                              Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     commercial
                   238
                                                                                       178
                                                      172
                                                                                                                           119
                                                                                                                                                                                            59
                                                                                                                                                                                                                             60
                                                                                                                                                                                                                                                                 21
```

```
RESULT
PAL1_PF
ID P1
 S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            망
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   맑
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              δÃ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         멍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                               30-MAY-2000
30-MAY-2000
10-CCT-2003
                                                                                                                                                                                                                                                                                                                                                                                             PAL1 PRUAV
064963;
            This
                                                                                                                                                                                       Wiersma P.A., Wu Z.;
wiersma P.A., Wu Z.;
henylalanine ammonia-lyase cloned
                                                                                                                                                                                                                      STRAIN=cv. Summit,
                                                                                                                                                                                                                                    SEQUENCE FROM N.A.
                                                                                                                                                                                                                                                                         Prunus avium (Cherry).
Eukaryota; Viridiplantae; Streptophyta; Embryophyta; Tracheophyta;
Spermatophyta; Magnoliophyta; eudicotyledons; core eudicots; rosids;
eurosids I; Rosales; Rosaceae; Amygdaloideae; Prunus.
                                                                                                                                                                                                                                                                                                                                         Phenylalanine
                                                                                                                                                                                                                                                                                                                                                                                                                       PRUAV
                                                                                                                                                                                                                                                            NCBI_TaxID=42229;
SWISS-PROT entry is copyright. It is producen the Swiss Institute of Bioinformatics
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               584
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         589
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    467
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         347
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            289
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  173
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   695
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   527
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               475
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       407
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               416
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   356
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               233
                                                                                                                                                                                                                                                                                                                                                                                                                                                                          690
                                                                                                                                                                                                                                                                                                                                                                                                                                                                          PGEEFDKVFTAICEGKIIDPMMECL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    S--LTREVR--NRFWQTPSSQAPAHAYLSPRTRVLYSFVREELGVQARRGDVFVGVQQET
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               VYTYADDP-----CSATYPLIQKLRQVIVDHALVNGESEKNAVTSIFH--KIGAFEEEL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        VHVLHEGTE-KIMFAREAISLFGLEA--VVLGPKEGLGLVNGTAVSASMATLSLHDSHML
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             KAVLPKEVEAARAAYDNGTSAIP-NRIKECRSYPLYRFVREELGT----
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         TTTYDLEPRWHDAFSYATGTVVE------LLSSSPSANVTLTAVNAWKVASAEKAI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   AICQAVDLRHLEENLRQTVKNTVSQVAKKVLTTG--VNG-ELHPSRFCEKDLLKVVDREQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    AEIAMÁSYCSELQYLANPVTSHVQSAEQHNQDVNSLGLISSRKTSEAVDILKLMSTTFLV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             LDIHIAAYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLY
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               GNFQASAVSISMEKTRLALALIGKLNFTQCTELLNAAMNRGLPSCL-AAEDPSLNYHGKG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         HEMDPLQKPKQDRYALRTSPQWLGPQIEVIRYATKSIEREINSVNDNPLIDVSRNKAIHG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   KVKDDEGILRQDRYPLRTSPQFLGPLVEDMMHAYSTLSLENNTTTDNPLLDVENKQTAHG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            SVLAEILSAVFAEVMSGKP-EFTDHLTHRLKHHPGQIEAAAVMEHILDGSSY-MKLAQKL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               A----TGPNGEALTAEEAFKLAGISSGFFDLQPKEGLALVNGTAVGSGMASMVLFETNVL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  INTLLQGFSGIRFEILEAITSFLNNNITPSLPLRGTITASGDLVPLSYIAGLLTGRPNSK
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   IGSNVSRIYEAIKDGRINHVLVKML
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CTLQAVDLRAMELDFKKQFDFLLFTLLQQHLGTGLDVNALALEVKKALNKRL------EQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       GNFQGTFIGVSMDNTRLAIRAIGKLMFAQFSELVNDFYNNGLPSNLTASRNPSLDYGFKG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     SLISQALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEV
                                                                                                                                                                                                                                                                                                                                         (Rel. 39, Created)
(Rel. 39, Last sequence update)
(Rel. 42, Last annotation update)
ne ammonia-lyase 1 (EC 4.3.1.5).
                                                                                                                                                                                                                                                                                                                                                                                                           STANDARD;
                                                                                                                                                                                                                                                                                                                                                                                                           PRT;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    719
 It is produced through a c
informatics and the EMBL
                                                                                                                                                                                                                                                                                                                                                                                                           717
                                                                                                                                                                                                                                                                                                                                                                                                           Å
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             -ELLTGEKVTS
                                                                                                                                                                                                from
  collaboration
L outstation -
                                                                                                                                                                                                ripe
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      526
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               534
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       466
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   415
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              689
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       694
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         638
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   583
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             588
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  474
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          406
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            346
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                288
```

```
Query Match
Best Local S
Matches 262
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Pfam; PF00221; PAL; 1.
TIGREAMS; TIGRO1226; phe am lyase; 1.
PROSITE; PS00488; PAL HISTIDASE; 1.
Lyase; Phenylpropanoid metabolism; Multigene family.
Lyase; Phenylpropanoid metabolism; CROSSLNK 203 205 5-imidazolinone (Ala-Gly)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     EMBL; AF036948; AAC78457.1; -.
HSSP; P21310; 1B8F.
InterPro; IPR006948; L-Aspartase-like.
InterPro; IPR001106; Phe/His NH3lyase.
InterPro; IPR005922; Phe_am_lyase.
Pfam; PF00221; PAL; 1.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      SEQUENCE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          or send an
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               modified and this entities requires
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          MOD_RES
               649
                                                                                                                                                                                         542
                                                                                                                                                                                                                                    466
                                                                                                                                                                                                                                                                             482
                                                                                                                                                                                                                                                                                                                        406
                                                                                                                                                                                                                                                                                                                                                               423
                                                                                                                                                                                                                                                                                                                                                                                                          348
                                                                                                                                                                                                                                                                                                                                                                                                                                                   363
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           292
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    307
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               232
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        249
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            189
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       122
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  129
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        62
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   71
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     14
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              φ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Similarity
WQTPSSQAPAHAYLSP-RTRVLYSFVREELGVQARRGDVFVGVQQETIGSNVSRIYEAIK
                                                                                                                                                                                                                                                                                                                                                                                                                                         ILRQDRYPLRTSPQFLGPLVEDMMHAYSTLSLENNTTTDNPLLDVENKQTAHGGNFQASA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          IMFAREAISLFGLEA--VVLGPKEGLGLVNGTAVSASMATLSLHDSHMLSLLSQALTALT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          VRLVVLEALINFLNHRITFIVFLRGSISASGDLSFLSYIAGAITGHPDVKVHVLHEGTEK
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  RTEDAVSLQKALIEHQLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIRVNSLTRGHSA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        ESUTISQVAAIATHDSGVKVELSESARAGVKASSDWVMDSMSKGTDSYGVTTGFGATSHR
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 YSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSV--YGVTTGFGGSADT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   NGFTNGSHAAPTKSAAGPTSALRRTP---GLDGHAAHQSQLEIVQELLSDPTDDVVELSG
                                                                                   TTYDLEPRWHDAFSYATGTVVELLSSSPSANVILTAVNAWKVASAEK-AISLTREVRNRF
                                                                                                                                                 LRHLEENLRNTVKNTVSQVAKRTLTTGVNGELHPSRFCEKDLLKVVDREYVFAYIDDPCS
                                                                                                                                                                                         LRAMELDFKKQFDPLLPTLLQQHLGTGLDVNALALE-VKKALNKRLEQ------T
                                                                                                                                                                                                                                       YCSELQFLANPVINHVQSAEQHNQDVNSLGLISSRKTAEAVDILKLMSSTFLVALCQAID
                                                                                                                                                                                                                                                                           YASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQAVD
                                                                                                                                                                                                                                                                                                                        IGVSMDNTRLAIASIGKLMFAQFSELVNDFYNNGLPSNLSGGRNPSLDYGFKGAEIAMAS
                                                                                                                                                                                                                                                                                                                                                               VSISMEKTRLALALIGKLNFTQCTELLNAAMNRGLPSCLA-AEDPSLNYHGKGLDIHIAA
                                                                                                                                                                                                                                                                                                                                                                                                          -- KODRYALRTSPOWLGPOIEVIRYSTKSIEREIDSVNDNPLIDVSRNKALHGGNFOGTP
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           AEVMQGKP-EFTDHLTHKLKHHPGQIEAAAIMEHILDGSSYVKAAKKLHEQDPLQKP---
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    VEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVE----HEEEVKVKDDEG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               TLSAAEAFEFVGINSGFFELQPKEGLALVNGTAVGSGLASTVLFDTNILALLSEILSAIF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   IRFEILEVITKFLINNVTPCLPLRGTITASGDLVPLSYIAGMLTGRPNSKA-VGPDG-
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       RTKQGAALQKELIRFLNAGVFGSTKES-----GHTLPHQATRAAMLVRINTLLQGYSG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      an Bioinformatics Institute. There are no restrictions on its on-profit institutions as long as its content is in no way not this statement is not removed. Usage by and for commercial equires a license agreement (See http://www.isb-sib.ch/announce/email to license@isb-sib.ch).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      717
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               204
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    AA
;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             204
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  77999 MW;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    28.4%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              SVELPELCIKKDPLNWGVAAETLKGSHLDEVKRMVAEYRKPVVKLGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                133;
                                                             VEHALTNGENEKNASTSIFQKIVAFEEELKVLLPKEVDSAR
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Score 1024;
Pred. No. 7
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        (By similarity).
DHA (2,3-DIDEHYDROALANINE)
(BY SIMILARITY).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    B84DF90FA0BF60B3
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Mismatches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    DB 1;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      ..
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      CRC64;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  60;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              ó
                                                                                                                                                                                                                                                                                                                                                               481
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        306
                                                                                                                                                                                            589
                                                                                                                                                                                                                                       525
                                                                                                                                                                                                                                                                                                                                                                                                            405
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           347
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    362
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   231
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            248
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       174
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       70
```

δ 밁 δ

8 8 당 Ş

AC009400; AAF02809 P21310; 1B8F.

restrictions and

for

TEMBL

outstation -

8 8

유 성 유 성

유 양 문

Ş 9 Ş Ъ Ş В S В

```
PALLY PALLY A

ID PALLY A

ID PALLY A

AC Q9SS45

DT 16-OCT

DT 16-OCT

DT 16-OCT

DT 16-OCT

DT 16-OCT

DT 16-OCT

DT 16-OCT

DT 16-OCT

DT 16-OCT

DT 16-OCT

DT 16-OCT

DT 16-OCT

DT 16-OCT

DT 16-OCT

DT 16-OCT

DT 16-OCT

DT 16-OCT

DT 16-OCT

DT 16-OCT

DT 16-OCT

DT 16-OCT

DT 16-OCT

DT 16-OCT

DT 16-OCT

DT 16-OCT

DT 16-OCT

DT 16-OCT

DT 16-OCT

DT 16-OCT

DO Sperma

OC NEDLIN

RX MEDLIN

RX MACAY

RA Watang

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA Mayer

RA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          RC STRAINE-C. Columbia;
RC MEDINE-C. Columbia;
RC MEDINE-21016720; PubMed-11130713;
RR MEDINE-21016720; PubMed-11130713;
RR MEDINE-21016720; PubMed-11130713;
RR MEDINE-21016720; PubMed-11130713;
RR MEDINE-21016720; PubMed-11130713;
RR Medine M., Calle G., Bloecker H., Perez-Alonso M., Obermaier B.,
RR Fartmann B., Valle G., Bloecker H., Perez-Alonso M., Obermaier B.,
RR Delseny M., Boutry M., Grivell L.A., Mache R., Dujdomenech P.,
RR Delseny M., Boutry M., Grivell L.A., Mache R., Brottier F.,
RR Mincker P., Cattolico L., Weissenbach J., Saurin W., Quetter F.,
RR Delseny M., Boutry M., Erfle H., Jordan N., Bangert S.,
RR Mincker P., Cattolico L., Weissenbach J., Saurin W., Quetter F.,
RR Mincker P., Cattolico L., Weissenbach J., Saurin W., Quetter F.,
RR Mincker P., Cannischer K., Kauber G., Lochnert T.-H., Nordsiek G.,
RR Witheld M., Drinischer K., Kauer G., Lochnert T.-H., Nordsiek G.,
RR Wezzi A., D'Angelo M., Pallavicini A., Toeppo S., Simionati B.,
RR Weischelt J., Scharfe M., Schoen O., Bargues M., Terol J., Climent J.,
RR Weischelt J., Scharfe M., Schoen O., Bargues M., Terol J., Climent J.,
RR Weischelt J., Scharfe M., Schoen O., Bargues M., Terol J., Climent J.,
RR Wonfort A., Argiriou A., Flores M., Liguori R., Vitale D.,
RR Mannhaupt G., Haase D., Schoof H., Rudd S., Zaccaria P., Mewes H.-W.,
RR Mayer K.F.X., Kaul S., Town C.D., Koo H.L., Tallon L.J., Jenkins J.,
RR Mayer K.F.X., Kaul S., Town C.D., Koo H.L., Tallon L.J., Jenkins J.,
RR Mayer K.F.X., Kaul S., Town C.D., Koo H.L., Tallon L.J., Jenkins J.,
RR Mayer K.F.X., Kaul S., Town C.D., Koo H.L., Tallon L.J., Jenkins J.,
RR Mayer K.F.X., Kaul S., Town C.D., Koo H.L., Tallon L.J., Jenkins J.,
RR Mayer K.F.X., Kaul S., Town C.D., Koo H.L., Tallon L.J., Jenkins J.,
RR Mayer K.F.X., Kaul S., Town C.D., Koo H.L., Tallon L.J., Jenkins J.,
RR Mayer K.F.X., Kaul S., Town C.D., Koo H.L., Tallon L.J., Jenkins J.,
RR Mayer K.F.X., Kaul S., Town C.D., Koo H.L., Tallon L.J., Jenkins J.,
RR Mayer K.F.X., Kaul S., Town C.D., Natsunoto S., Kato T., Asamizu E.,
R
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            5
                                                                                                                                           This SWISS-PROT entry is copyright. It is produced through between the Swiss Institute of Bioinformatics and the Entropean Bioinformatics Institute. There are no restructe by non-profit institutions as long as its content modified and this statement is not removed. Usage by and entitles requires a license agreement (See http://www.isb-srsend an email to license@isb-sib.ch).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Nature 408:820-822(2000).

1- FUNCTION: This is a key enzyme of plant metabolism catalyzing the first reaction in the biosynthesis from L-phenylalanine of a wide variety of natural products based on the phenylpropane skeleton.

1- CATALTIC ACTIVITY: L-phenylalanine = trans-cinnamate + NH(3).

1- PATHMAY: Phenylpropanoid biosynthesis; first step.

1- SUBCELLIDIAR LOCATION: Cytoplasmic (Probable).

1- PTM: Contains an active site 4-methyldene-imidazole-5-one (MIO), which is formed autocatalytically by cyclization and dehydration of residues Ala-Ser-Gly (By similarity).

1- SIMILARITY: Belongs to the PAL / histidase family.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           PAL4_ARATH STANDARD; PRT; 707 AA.

09S845;
16-OCT-2001 (Rel. 40, Created)
16-OCT-2001 (Rel. 40, Last sequence update)
10-OCT-2003 (Rel. 42, Last annotation update)
10-OCT-2003 (Rel. 42, Last annotation update)
10-OCT-2003 (Rel. 42, Last annotation update)
10-OCT-2003 (Rel. 42, Last annotation update)
10-OCT-2003 (Rel. 42, Last annotation update)
11-0-OCT-2003 (Rel. 42, Last annotation update)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               "Sequence and analysis thaliana.";
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Arabidopsis thaliana (Mouse-ear cress).

Bukaryota; Viridiplantae; Streptophyta; Embryophyta; Tracheophyta;

Spermatophyta; Magnoliophyta; eudicotyledons; core eudicots; rosid
eurosids II; Brassicales; Brassicaceae; Arabidopsis.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           695
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 708
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       FROM N.A. v. Columbia;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            DGRI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           EGKI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Mewes H.-W.,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                               മ
                                                                                                                                                                                                                                                                                                                                                                                                                              collaboration
L outstation -
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        wide
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            ۳.4
.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   <u>ត</u>
```

```
RESULT
PALY TH
ID PAL
AC P4
DT 01
DT 01
DT 11
                                                                                                                                                                  8
                                                                                                                                                                                            B,
                                                                                                                                                                                                                 Ś
                                                                                                                                                                                                                                          멍
                                                                                                                                                                                                                                                              Ś
                                                                                                                                                                                                                                                                                      B
                                                                                                                                                                                                                                                                                                        Ş
                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                       Š
                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                                                                   8
                                                                                                                                                                                                                                                                                                                                                                                                                             B
                                                                                                                                                                                                                                                                                                                                                                                                                                                 Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                        В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ŗ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              ğ
                                                                                                                         á
                                                                                                                                                 망
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         DR DR DR FTT FTT SQ
                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Query Match
Best Local Sim
Matches 261;
01-NOV-1995
01-NOV-1995
10-OCT-2003
                                PALY TRISU
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                InterPro; IPR008948; L-Aspartase-like.
InterPro; IPR001106; Phe/His NH31yase.
InterPro; IPR009122; Phe_mm_Iyase.
InterPro; IPR009221; PhAL; 1.
TIGRFAMs; TIGR01226; phe_am_Iyase; 1.
TIGRFAMs; TIGR01226; phe_am_Iyase; 1.
PROSITE; PS00488; PAL_HISTIDASE; 1.
Lyase; Phenylpropanoid metabolism; Multigene family.
Lyase; Phenylpropanoid metabolism; Multigene family.
CROSSLNK 194 196 5-imidazolinone (Ala-Gly)
                                                       TRISU
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         SEQUENCE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            MOD_RES
                                                                                                     649
                                                                                                                           667
                                                                                                                                                                        610
                                                                                                                                                                                                                    580
                                                                                                                                                                                                                                           494
                                                                                                                                                                                                                                                                                       434
                                                                                                                                                                                                                                                                                                            461
                                                                                                                                                                                                                                                                                                                                   374
                                                                                                                                                                                                                                                                                                                                                          401
                                                                                                                                                                                                                                                                                                                                                                               319
                                                                                                                                                                                                                                                                                                                                                                                                      345
                                                                                                                                                                                                                                                                                                                                                                                                                             260
                                                                                                                                                                                                                                                                                                                                                                                                                                                   285
                                                                                                                                                                                                                                                                                                                                                                                                                                                                         203
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      143
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           166
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       109
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     49
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              30
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  90
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Similarity
                                                                                                    YPLYRFVRDELNT----
                                                                                                                                                                                                                                                                                                      LA-AEDPSLNYHGKGLDIHIAAYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTA
                                                                                                                                                                                                                                                                                                                                   DNPLIDVSRNKALHGGNFQGTPIGVAMDNSRLAIASIGKLMFAQFSELVNDFYNNGLPSN
                                                                                                                                                                                                                                                                                                                                                       DNPLLDVENKQTAHGGNFQASAVSISMEKTRLALIALIGKLNFTQCTELLNAAMNRGLPSC 460
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      AQLQNSV--YGVTTGFGGSADTRTEDAVSLQKALIEHQLCGVTPTSXSSFSVGRG-LENT
                                                                                                                         RVLYSFVREELGVQARRGDVFVGVQQETIGSNVSRIYEAIKDGRINHVLVKML 719
                                                                                                                                                 VDHALADPEREANSATSVFHKIGAFEAELKLLLPKEVERVRVEYEEGTSAIANRIKECRS
                                                                                                                                                                      VELLSSSP--SANVTLTAVNAWKVASAEKAISLTREV-RNRFWQTPSSQAPAHAYLSPRT
                                                                                                                                                                                             SAVSQVAKRVLTVGANGELHPSRFTERDVLQVVDREYVFSYADDPCSLTYPLMQKLRHIL
                                                                                                                                                                                                                   KALNKRLEQTTTYDLEPRWHDA-----FSYATG-----TV
                                                                                                                                                                                                                                          EAVDILKLMSTTYLVALCQAVDLRHLEENLKK------
                                                                                                                                                                                                                                                               EANDVLSLLLASHLYCTLQAVDLRAMELDFKKQFDFLLFTLLQQHLGTGLDVNALALEVK 579
                                                                                                                                                                                                                                                                                     LSGGRNPSLDYGFKGAEIAMASYCSELQFLANPVINHVQSAEQHNQDVNSLGLISSRKTA 493
                                                                                                                                                                                                                                                                                                                                                                              SSYVKEAQLLHEMDPLQKP-----KQDRYALRTSPQWLGPQIEVIRAATKMIEREINSVN
                                                                                                                                                                                                                                                                                                                                                                                                     SSFAVE----HEEEVKVKDDEGILRODRYPLRTSPOFLGPLVEDMMHAYSTLSLENNTTT
                                                                                                                                                                                                                                                                                                                                                                                                                             ASTVLFDANILAVISEVMSAMFAEVMOGKP-EFTDHLTHKLKHHPGQIEAAAIMEHIIDG
                                                                                                                                                                                                                                                                                                                                                                                                                                                  ATLSLHDSHMLSLLSQALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                         YIAGLLTGRPNSKA-VGPSG--ETLTASEAFKLAGVSSFFELQPKEGLALVNGTAVGSGL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             YIAGAITGHPDVKVHVLHEGTEKIMFAREAISLFGLEAVV-LGPKEGLGLVNGTAVSASM
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      LPKPTTRAAMLVRVNTLLOGYSGIRFEILEAITKLLNHEITPCLPLRGTITASGDLVPLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         LPLEVVRGAMVIRVNSLTRGHSAVRLVVLEALTNFLNHRITPIVPLRGSISASGDLSPLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  ESMNRGTDSYGVTTGFGATSHRRTKQGGALQNELIRFLNAGI-----FGPGAGDTSHT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              SHLDEVKRMVKEYRKEAVKLGGETLTIGQVAAVARGGGGSTVELAEEARAGVKASSEWVM
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    SQLEIVQELLSDPTDDVVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLK 108
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        707
 (Rel.
(Rel.
(Rel.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               195
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        A.
                                             STANDARD;
. 32, Created)
. 32, Last seq.
. 42, Last anno
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               195
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        76919 MW;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    28.3%;
Last sequence update)
Last annotation updat
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           116;
                                                                                                    ELLTGENVRSPGEEFDKVFLAISDGKLIDPLLECL 696
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Score 1020;
Pred. No. 1.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      (By similarity).
DHA (2,3-DIDEHYDROALANINE)
(BY SIMILARITY).
B67743C941B50B9B CRC64;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Mismatches
                                             725
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1.4e-60;
                                             Ą
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Indels
                                                                                                                                                                                                                                          -----AVK
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           88
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Gaps
                                                                                                                                                                                                                                          528
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       165
                                                                                                                                                                      666
                                                                                                                                                                                             588
                                                                                                                                                                                                                   609
                                                                                                                                                                                                                                                                                                            519
                                                                                                                                                                                                                                                                                                                                   433
                                                                                                                                                                                                                                                                                                                                                                                                      400
                                                                                                                                                                                                                                                                                                                                                                                                                             318
                                                                                                                                                                                                                                                                                                                                                                                                                                                                         259
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               284
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      202
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          225
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              89
                                                                                                                       Š
                                                                                                                                                                  γ
                                                                                                                                                                                                                                                                                       Š
                                                       뮍
                                                                         Š
                                                                                                    뮍
                                                                                                                                                 В
                                                                                                                                                                                            밁
                                                                                                                                                                                                                δ
                                                                                                                                                                                                                                                                                                         MOD_RES
```

```
Query Match
Best Local Simi
Matches 273;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CROSSLNK
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             This SWISS-PROT entry is copyright. It is produced through a collaboration between the Swiss Institute of Bioinformatics and the EMBL outstation the European Bioinformatics Institute. There are no restrictions on its use by non-profit institutions as long as its content is in no way modified and this statement is not removed. Usage by and for commercial entities requires a license agreement (See http://www.isb-sib.ch/announce/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       SEQUENCE -
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          InterPro; IPR008948; L-Aspartase-like.
InterPro; IPR001106; Phe/His NH3.Yase.
InterPro; IPR005122; Phe_am_lyase.
Pfam; PF00221; PAL; 1.
TIGRPAMS; TIGR01226; Phe_am_lyase; 1.
TIGRPAMS; TIGR01226; Phe_am_lyase; 1.
PROSITE; PS00488; PAL HISTIDASE; 1.
Lyase; Phenylpropanoid metabolism; Multigene
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         EMBL; M91192; AAA17993.1; -. HSSP; P21310; 188F.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            entities requires a license agreement (Storm send an email to license@isb-sib.ch).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      in Trifolium subterraneum.";
Gene 138:87-92(1994).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    MEDLINE=94171061; PubMed=8125321; Howles P.A., Arioli T., Weinman J.J.; "Characterization of a phenylalanine
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          STRAIN=cv. Karridale; TISSUE=Leaf;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Eukaryota; Viridiplantae; Streptophyta; Embryophyta; Tracheophyta; Spermatophyta; Magnoliophyta; eudicotyledons; core eudicots; rosids; eurosids I; Fabales; Fabaceae; Papilionoideae; Trifolieae; Trifolium
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Phenylalanine ammonia-lyase (EC 4.3.1.5). PAL1.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  SEQUENCE FROM N.A.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        NCBI_TaxID=3900;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Trifolium subterraneum (Subterranean
                                                                                      177
                                                                                                                                                                                                                             123
                                                                                                                                                                                                                                                                          φ
                                                                                                                                                                                                                                                                                                                      ტ
ტ
                                                                                                                                                                                                                                                                                                                                                                 17
                                                                                                                                                                                                                                                                                                                                                                                                               b
                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Similarity
                                                                                                                                                                                                                                                                                                  VELSGYSLTVRDVVG-AARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSV--YGVTTGF
                                                                                                                                                                                 GATSHRRTKQGGALQKELIRFLNAGI-----FGNGTESNHTLPHTATRAAMLVRINTL
                                        HEGTEKIMFAREAISLFGLEA--VVLGPKEGLGLVNGTAVSASMATLSLHDSHMLSLLSQ 300
                                                                                      GGSADTRTEDAVSLQKALIEHQLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIRVNSL 182
HGPSGEMLNAKEAFQLAGINAEFFELQPKEGLALVNGTAVGSGLASIVLFEANILAVLSE
                                                                                                                                                                                                                                                                          VRLGGETLTISQVAAIAAHDGATVEL--SESARAGVKASSDWVMESMNKGTDSYGVTTGF
                                                                                                                                                                                                                                                                                                                                                                 DSFCLTHAN--ANNMKV----NAADPLNW-----GVAAEANKGSHLDEVKRMVEEYRKPV
                                                                                                                                                                                                                                                                                                                                                                                                            DSLATTLANGFTNGSHAAPTKSAAGPTSALRRTPGLDGHAAHQSQLEIVQELLSDPTDDV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                725 AA;
                                                                                                                                                                                                                                                                                                                                                                                                                                                       Conservative 127; Mismatches 254;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            212
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              212
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   78998 MW;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                        28.2%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Score 1019;
Pred. No. 1.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      (By similarity).

DHA (2,3-DIDEHYDROALANINE (BY SIMILARITY).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         lism; Multigene family.
5-imidazolinone (Ala-Gly)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   70F9925C86622240 CRC64;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ammonia-lyase multigene
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         clover).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                             DB 1;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                            Indels 104;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                collaboration
                                                                                                                                                                                                                                                                                                                                                                                                                                                       Gaps
                                                                                                                                                                                                                                                                                                                      122
                                                                                                                                                                                                                                                                          123
                                                                                                                                                                                                                                                                                                                                                                 65
                                                                                                                                                                                                                                                                                                                                                                                                               65
                                                                                           233
```

```
RESULT PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE PALS IN THE
                                                                                                                                                                                                                                   Appert C., Logemann E., Hahlbrock K., Schmid J., Amrhein N.;
Appert C., Logemann E., Hahlbrock K., Schmid J., Amrhein N.;
Appert C., Logemann E., Hahlbrock K., Schmid J., Amrhein N.;

Repert C., Logemann E., Hahlbrock K., Schmid J., Amrhein N.;

"Structural and catalytic properties of the four phenylalanine

"Structural and catalytic parsite (Petrosellnum crispum Nym.).";

Lur. J. Biochem. 225:491-499(1994).

"I Biochem. 225:491-499(1994).

"I FUNCTION: This is a key enzyme of plant metabolism catalyzing the
first reaction in the biosynthesis from L-phenylalanine of a wide

"C. FUNCTION: This is a key enzyme of plant metabolism catalyzing the
first reaction in the biosynthesis from L-phenylalanine of a wide

"C. Variety of natural products based on the phenylpropane skeleton."

"C. CATALYTIC ACTIVITY: L-phenylalanine = trans-cinnamate + NH(3)."

"C. I-PATHWAY: Phenylpropanoid biosynthesis; first step.

"I SUBCELLULAR LOCATION: Cytoplasmic (Probable).

"C. I-PTM: Contains an active site 4-methylidene-imidazole-5-one (MIO),
which is formed autocatalytically by cyclization and dehydration

of residues Ala-Ser-Gly (By similarity).

"C. I-SINILARITY: Belongs to the PAL / histidase family.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                PAL3 PETCR
PAL3 PETCR
P45729;
This SWISS-PROT entry is copyright. It is produced through between the Swiss Institute of Bioinformatics and the EX the Buropean Bioinformatics Institute. There are no restruce by non-profit institutions as long as its content modified and this statement is not removed. Usage by and entities requires a license agreement (See http://www.isb-sorsend an email to license@isb-sib.ch).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Petroselinum crispum (Parsley) (Petroselinum hortense).
Bukaryota; Viridiplantae; Streptophyta; Embryophyta; Tracheop
Spermatophyta; Magnoliophyta; eudicotyledons; core eudicots;
campanulids; Apiales; Apiaceae; Apioideae; apioid superclade;
Apium clade; Petroselinum.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   01-NOV-1995 (Rel. 32, Created)
01-NOV-1995 (Rel. 32, Last sequence update)
10-OCT-2003 (Rel. 42, Last annotation updat
Phenylalanine ammonia-lyase 3 (EC 4.3.1.5).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           SEQUENCE FROM N.A.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             682
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               625
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          567
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         596
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              468
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          476
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        408
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    417
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  353
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              357
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       LCQAIDLRHLEENLK:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           EIAMASYCSELQYLANPVTTHVQSAEQHNQDVNSLGLISSRKTKEAIEILQLMSSTFLIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        RRGDVFVGVQQETIGSNVSRIYEAIKDGRINHVLVKML 719
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Q----KIATFEEELKTLLPKEVESARTAYENGNSTIANKINGCRSYPLYKFVREELGTSL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               AVNAWKVASAEKAIS--LTREVRN-RFWQTPSSQAPAHAYLSPRTRVLYSFVREELGVQA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             PSRFCEKDLLKVVDREH-VFSYIDDPCSATYPLAQKLRQVLVDHALVNGESEKNSNTSIF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                TLOAVDLRAMELDFKKOFDFLLFTLLQQHLGTGLDVNALALEVKKALNKRLEQTTTYDLE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   DIHIAAYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        NFQGTPIGVSMDNTRLALASIGKLLFAQFSELVNDFYNNGLPSNLSASRNPSLDYGFKGS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    NFQASAVSISMEKTRLALALIGKLNFTQCTELLNAAMNRGLPSCL-AAEDPSLNYHGKGL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  QKP-----KODRYALRTSPOWLGPLIEVIRFSTKSIEREINSVNDNPLIDVSRNKALHGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   VKDDEGILRQDRYPLRTSPQFLGPLVEDMMHAYSTLSLENNTTTDNPLLDVENKQTAHGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      VLSAIFAEVMQGKP-EFTDHLTHKLKHHPGQIEAAAIMEHILHGSAYVKDAKKLHEMDPL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ALTALITVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVE----HEEEVK
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         P------SSSPSANVTLT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 STANDARD;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             -SPGEECDKLFTAMCQGKIIDPLLKCL 714
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          update)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 718
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 A
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    -NSVKNTVSQVAKKTLTIGVSGELH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Tracheophyta;
                                                                                            restrictions
                                                              and
                                                                                                                                                       EMBL outstation
                                                                                                                                                              collaboration
L outstation -
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     wide
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               681
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             625
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    566
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              527
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          535
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        467
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               407
                                    밁
                                                                        8
                                                                                                                                                           밁
                                                                                                                                                                                                     Ş
                                                                                                                                                                                                                                                                    Вb
                                                                                                                                                                                                                                                                                                                                δ
                                                                                                                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                      δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             SOT FIT WAS A CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Query Match
Best Local
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Matches 269;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     EMBL; X81159; CAA57057.1; -.
PIR; S48726; S48726.
HSSP; P21310; 1B8F.
InterPro; IPR008948; L-Aspartase-like.
InterPro; IPR001106; Phe/His_NH31yase.
InterPro; IPR005922; Phe_am_lyase.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Pfam; PF00221; PAL; 1.
TIGREAMS; TIGRO1226; phe am lyase; 1.
PROSITE; PS00488; PAL HISTIDASE; 1.
Lyase; Phenylpropanoid metabolism; Multigene CROSSLNK 204 206 5-imidazolinone
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 SEQUENCE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         MOD_RES
                                                                                                                                                                                                                                                                                                                                                                                                           526
                                                                                                                                                                                                                                                                                                                                                                                                                                                                          541
                                    169
                                                                                            703
                                                                                                                                                                                                                                                                                     583
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         466
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 481
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                406
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           422
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      346
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     362
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    288
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            302
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           228
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 171
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                184
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               120
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          127
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 70
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        14
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            ហ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Similarity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  SYCSELQFLANPYTNHVQSAEQHNQDVNSLGLISSRKTSEAVEILKLMSTTFLVGLCQAI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           GILRODRYPLRTSPQFLGPLVEDMMHAYSTLSLENNTTTDNPLLDVENKQTAHGGNFQAS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       GPTGVTLSPEEAFKLAGVEGGFFELQPKEGLALVNGTAVGSGMASMVLFEANILAVLAEV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         RGHSAVRLVVLEALTNFLNHRITPIVPLRGSISASGDLSPLSYIAGAITGHPDVKVHVLH
:|:|:|:||:||:||:||:||
                                                                                               YEAIKDGRINHVLVKML
                                                                                                                                                                                                                                                                                     DPCSATYPLMQKLRE-----
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    AYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQAV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                PIGVSMDNTRLAIAAIGKLMFAQFSELVNDFYNNGLPSNLSGGRNPSLDYGFKGAEIAMA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       AVSISMEKTRLALALIGKLNFTQCTELLNAAMNRGLPSCLA-AEDPSLNYHGKGLDIHIA:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    MSAIFAEVMOGKP-EFTDHLTHKLKHHPGOIEAAAIMEHILDGSAY-VKAAQKLHEMDPL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            LTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEVKVKDDE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               EGTEKIMFAREAISLFGLEA--VVLGPKEGLGLVNGTAVSASMATLSLHDSHMLSLLSQA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 HRRTKQGGALQKELIRFLNAGI------FGSGAEAGNNTLPHSATRAAMLVRINTLL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          DTRTEDAVSLQKALIEHQLCGVTPTSXSSFSVGRGLE---NTLPLEVVRGAMVIRVNSLT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 GYSLTVRDVVG-AARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSV--YGVTTGFGGSA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           NGFTNGSHAAPTKSAAGPTSALRRTP----GLDGHAAHQSQLEIVQELLSDPTDDVVELS
                                                                                                                                                                                                                   VRN-REWQTPSSQAPAHAYLSPRTRVLYSFVREELGVQARRGDVFVGVQQETIGSNVSRI
                                                                                                                                                                                                                                                                                                                                                                                                           DIRHLEENLKSTVKNTVSQVAKRVITMG--VNG-EIHPSRFCEKDLLRVVDREYIFAYID
                                                                                                                                                                                                                                                                                                                                                                                                                                                                       DIRAMEIDEKKOFDPILETILOOHIGTGIDVNALALEVKKALNKRIEO
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          QKPKQDRYALRTSPQWLGPQIEVIRSSTKMIEREINSVNDNPLIDVSRNKAIHGGNFQGS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      GETLTISQVAAISARDDSGVKVELSEEARAGVKASSDWVMDSMNKGTDSYGVTTGFGATS
                                                                                                                                                              VETARAALESGNPAIPNRIKECRSYPLYKFVREELGT---
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 718
                                                                                                                                                                                                                                                                                                                                             -TTTYDLEPRWHDAFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAIS--LTRE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               205
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 AA;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               205
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 78165
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 28.2%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                -NGNGLDLCMKKEDPLNWGVAAEALTGSHLDEVKRMVAEYRKPVVKLE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      128; Pred. No. 2e-6
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    ¥.
                                                                                            719
                                    707
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Score 1017.5;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           DHA (2,3-DIDEHYDROALANINE (BY SIMILARITY).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          (By similarity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    17786451FFDBDC35 CRC64;
                                                                                                                                                                                                                                                                                        /EHALNNGDKERNLSTSIFQKIAAFEDELKAL1PKE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           2e-60;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      275;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     DB 1;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       (Ala-Gly)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Indels
                                                                                                                                                              -EYLTGEKVRSPĞEEFEKV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          65;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Gaps
                                                                                                                                                                                                                         702
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            119
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   59
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         525
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      465
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             405
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        421
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    345
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   243
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              183
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    126
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              69
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           287
```

뮍 Š B S 음 성 밁 Ş

19

유성

밁

성 유

8 멍

```
PRESULT 10
PALL TYPE
ID PALL TYPE
AC P25872
DT 01-MAY
DT 01-MAY
DT 01-MAY
DT 01-MAY
DT 01-MAY
DT 01-MAY
DT 01-MAY
DT 01-MAY
DT 01-MAY
DT 01-MAY
DT 01-MAY
DT 01-MAY
CC Sperma
CC -!- FI
CC -!- FI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC -!- SI
CC
                                       Ş
                                                                                                  В
B
                                                                                                                                                                                                           Query Match
Best Local S
Matches 270
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      This SWISS-PROT entry is copyright. It is produced through a collaboratic between the Swiss Institute of Bioinformatics and the EMBL outstation the European Bioinformatics Institute. There are no restrictions on it use by non-profit institutions as long as its content is in no was modified and this statement is not removed. Usage by and for commercial entities requires a license agreement (See http://www.isb-sib.ch/announce or send an email to license@isb-sib.ch).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     01-MAY-1992 (Rel. 22, Created)
01-MAY-1992 (Rel. 22, Last sequence update)
10-OCT-2003 (Rel. 42, Last annotation update)
Phenylalanine ammonia-lyase (EC 4.3.1.5).
TPA1 OR PALB.
                                                                                                                                                                                                                                                                                                                                                                                                                   InterPro; IPR008948; L-Aspartase-like.
InterPro; IPR001106; Phe/His NH31yase.
InterPro; IPR005126; Phe_am_Tyase.
InterPro; IPR005127; Phe_am_Tyase;
Pfam; PF00221; PAL; 1.
TIGRPAMS; TIGR01226; Phe am_Tyase; 1.
PROSITE; P800488; PAL HISTIDASE; 1.
Lyase; Phenylpropanoid metabolism; Multigene family.
Lyase; Phenylpropanoid metabolism; Multigene family.
Lyase; Phenylpropanoid metabolism; Multigene family.
CROSSLNX 201 203 5-imidazolinone (Ala-Gly)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Eukaryota; Viridiplantae; Streptophyta; Embryophyta; Tracheophyta; Spermatophyta; Magnoliophyta; eudicotyledons; core eudicots; asterlamiids; Solanales; Solanaceae; Nicotiana.
                                                                                                                                                                                                                                                                                                                      SEQUENCE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  EMBL; M84466; AAA34122.1; -. EMBL; AB008200; BAA22948.1; -.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               STRAIN=cv. Bright Yellow;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        SEQUENCE FROM N.A.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Submitted (XXX-1992)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Fukasawa-Akada
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      SEQUENCE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      NCBI_TaxID=4097;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Nicotiana tabacum (Common tobacco)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          PAL1 TO 
P25872;
                                                                                                                                                                                                                                                                                                                                                                   MOD_RES
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   S66343; S66343.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      TOBAC
                                                                                                                                                                                                             270;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            P21310; 1B8F
5
8
                                             72
                                                                                                                                                        13
                                                                                                                                                                                                                                       Similarity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   FROM N.A.
  SĹTVAQVAAIÁVRDKSANGVKVELSEEARÁGVKASSDWVMDSMNKGTDSYGVTTGFGATS
                                               SLTVRDVVGAA---RKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSV--YGVTTGFGGSA 126
                                                                                                                                                        ANGFTN-GSHAAPTKSAAGPTSALRRTPGLDGHAAHQSQLEIVQELLSDPTDDVVELSGY
                                                                                                                                                                                                                                                                                                                      715 AA;
                                                                                                                                                                                                             Conservative 130;
                                                                                                                                                                                                                                                                                                                                                                            202
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      STANDARD;
                                                                                                                                                                                                                                                                                                                                                                            202
                                                                                                                                                                                                                                                                                                                      77780 MW;
                                                                                                                                                                                                                                    28.2%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 to the EMBL/GenBank/DDBJ databases.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  ow; TISSUE=Callus;
Gonda K., Yanagisawa K., Shimosaka M.,
                                                                                                                                                                                                           Score 1016.5;
Pred. No. 2.4e
30; Mismatches
                                                                                                                                                                                                                                                                                                                   DHA (2,3-DIDEHYDROALANINE)
(BY SIMILARITY).
; 03CB4E8527394C62 CRC64;
                                                                                                                                                                                                                                                                                                                                                                                               (By similarity)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      PRT;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      715
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       (See http://www.isb-sib.ch/announce/
                                                                                                                                                                                                                                       5; DB 1; Length .4e-60;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      B
                                                                                                                                                                                                             259;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            core eudicots; asterids;
                                                                                                     -SHLDEVKKMVSEFRKPMVKLGGE
                                                                                                                                                                                                             Indels
                                                                                                                                                                                                             91;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            a collaboration
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       commercial
                                                                                                     57
```

```
RESULT 11
       ALY POPTR
ALY POPTR
D PALY POPTR STANDARD;
C P45730;
OT 01-NOV-1995 (Rel. 32, Created)
DT 01-NOV-1995 (Rel. 32, Last sequence update)
DT 01-OCT-2003 (Rel. 42, Last annotation update)
C 10-OCT-2003 (Rel. 42, Last annotation update)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         먕
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                ₽
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  닭
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Š
Bukaryota; Viridiplantae; Streptophyta; Embryophyta; Tracheophyta; Spermatophyta; Magnoliophyta; eudicotyledons; core eudicots; rosid: eurosids I; Malpighiales; Salicaceae; Saliceae; Populus. NCBI_TaxID=3694;
                                                                                                                                                                               SEQUENCE FROM N.A.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  346
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               365
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            171
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               127
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        621
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                561
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             602
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 466
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             484
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      425
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          288
                                                                                                                                                                                                                                                                                                                                                                                                                                              EKVRSPGEECDKVFTAMCNGQIIDPMLECL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        HLEENLK---
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             SAVRLVVLEALINFLNHRITPIVPLRGSISASGDLSPLSYIAGAITGHPDVKVHVLHEGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        SELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQAVDLR
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          VSMDNARLALASIGKLMFAQFSELVNDYYNNGLPSNLTASRNPSLDYGFKGAETAMASYC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    ISMEKTRIALALIGKINFTQCTELLNAAMNRGLPSCL-AAEDPSLNYHGKGLDIHIAAYA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             RODRYPLRTSPOFIGPLVEDMMHAYSTLSLENNTTTDNPLLDVENKOTAHGGNFOASAVS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         IFAEVMNGKP-EFTDHLTHKLKHHPGQIEAAAIMEHILDGSSY-VKAAQKLHBMDPLQKP
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      SGIRFEILEAITKLINSNITECLPLRGTITASGDLVPLSYIAGLLTGRENSKA-VGENG-
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    HRRTKNGGALQKELIRFLNAGV-----FGNGTETSHTLPHSATRAAMLVRINTLLQGY
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               DTRTEDAVSLOKALIEHQLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIRVNSLTRGH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                           VQQETIGSNVSRIYEAIKDGRINHVLVKML
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    FEDELKAV-LPKEVESARAALESGNPAIPNRITECRSYPLYRFVRKELGT----
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 AE---KAISLTREVRN-RFWQTPSSQAPAHAYLSPRTRVLYSFVREELGVQARRGDVFVG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    AMELDFKKQFDPLLPTLLQQHLGTGLDVNALALEVKKALNKRLEQTTTYDLEPRWHDA--
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              SELQFLANDVINHVQSAEQHNQDVNSLGLISARKTAEAVDILKLMSSTYLVALCQAIDLR
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  KODRYALRTSPOWLGPOIEVIRAATKMIEREINSVNDNPLIDVSRNKALHGGNFOGTPIG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     LTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEVKVKDDEGIL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CEKELLRIVDREYLFAYADDPCSCNYPLMQKLRQVLVDHAMNNGESEKNVNSSIFQKIGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  -ETLNAEEAFRVAGVNGGFFELQPKEGLALVNGTAVGSGMASMVLFDSNILAVMSEVLSA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             -----FSYATG------TVVELLSSSPSANVTLTAVNAWKVAS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        -----TMA----VKNTVSQVAKRTLTMGANGELHPÄRF
                                                                                                                                                                                                                                                                                                                                                                                                                                                 704
                                                                                                                                                                                                                                         core eudicots; rosids;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       483
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               424
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        246
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             633
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   525
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          465
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            345
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         364
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       170
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          674
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     689
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   620
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          560
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       601
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             543
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     287
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              228
```

```
멍
                                                                   Ş
                                                                                                             밁
                                                                                                                                          Š
                                                                                                                                                                                   В
                                                                                                                                                                                                                        8 B
                                                                                                                                                                                                                                                                                                  8
                                                                                                                                                                                                                                                                                                                                                 암정
                                                                                                                                                                                                                                                                                                                                                                                                                   멼
                                                                                                                                                                                                                                                                                                                                                                                                                                                        8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Query Match
Best Local S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Matches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           EMBL; L11747; AAA33805.1; -.
HSSP; P21310; 1BBF.
InterPro; IPR0018948; L-Aspartase-like.
InterPro; IPR001106; Phe/His NH3lyase.
InterPro; IPR001106; Phe/His NH3lyase.
Pfam; P700221; PAL; 1.
TIGRPAMS; TIGR01226; Phe_am_lyase; 1.
PROSITE; P800488; PAL, HISTIDASE; 1.
Lyase; Phenylpropanoid metabolism; Multigene family.
Lyase; Phenylpropanoid metabolism; Multigene family.
CROSSLNK 201 203 5-imidazolinone (Ala-Gly)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             This SWISS-PROT entry is copyright. It is produced through a collaboration between the Swiss Institute of Bioinformatics and the EMBL outstation the European Bioinformatice Institute. There are no restrictions on its use by non-profit institutions as long as its content is in no way modified and this statement is not removed. Usage by and for commercial entitles requires a license agreement (See http://www.isb-sib.ch/announce/or send an email to license@isb-sib.ch).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       SEQUENCE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        MOD_RES
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      PTW: Contains an active site 4-methylidene-imidazole-5-one (MIO) which is formed autocatalytically by cyclization and dehydration of residues Ala-ser-cly (By similarity).

SIMILARITY: Belongs to the PAL / histidase family.
                                       518
    589
                                                                            536
                                                                                                                   458
                                                                                                                                                        476
                                                                                                                                                                                                                                    417
                                                                                                                                                                                                                                                                         343
                                                                                                                                                                                                                                                                                                              357
                                                                                                                                                                                                                                                                                                                                                      284
                                                                                                                                                                                                                                                                                                                                                                                           301
                                                                                                                                                                                                                                                                                                                                                                                                                                  224
                                                                                                                                                                                                                                                                                                                                                                                                                                                                     243
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              167
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 183
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        116
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               125
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           266;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    56
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         89
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 \vdash
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    œ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Similarity
                                       LCQAIDLRHLEENLKSAVKNTVSQVSKRVLTTGANGE----LHPSRFCEKELLKVVDREYV
                                                                            TLQAVDLRAMELDFKKQFDPLLPTLLQQHLGTGLDVNALALEVKKALNKRLEQ------
                                                                                                                   EIAMASYCSELQYLANPVTTHVQSAEQHNQDVNSLGLISSRKTAEAVDILKLMSTTFLVA
                                                                                                                                       DIHIAAYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYC
                                                                                                                                                                                                                      NFQASAVSISMEKTRLALALIGKLNFTQCTELLNAAMNRGLPSCL-AAEDPSLNYHGKGL
                                                                                                                                                                                                                                                                           QKP----
                                                                                                                                                                                                                                                                                                  VKDDEGILRQDRYPLRTSPQFLGPLVEDMMHAYSTLSLENUTTTUNPLLDVENKQTAHGG
                                                                                                                                                                                                                                                                                                                                                   LLSAIFAEVMNGKP-EFTDHLTHKLKHHPGQIEAAAIMEHILDGSAYMKAAKKLHETDPL
                                                                                                                                                                                                                                                                                                                                                                                           ALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVE----HEEEVK
                                                                                                                                                                                                                                                                                                                                                                                                                                  TGPTGEVLDAAEAFKAAGI
                                                                                                                                                                                                                                                                                                                                                                                                                                                        HEGTEKIMFAREAISLFGLEA--VVLGPKEGLGLVNGTAVSASMATLSLHDSHMLSLLSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 TRGHSAVRLVVLEALTNFLNHRITPIVPLRGSISASGDLSPLSYIAGAITGHPDVKVHVL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           SADTRTEDAVSLQKALIEHQLCGVTPTSXSSFSVGRGLE--NTLPLEVVRGAMVIRVNSL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                LGGETLTTAQVASTAGHDTGDVKVELSESARPGVKASSDWVMDSMDKGTDSYGVTTGFGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 METVTKNGYQNGSLESLCVNQRDPLSW-----GVAAEAMKGSHLDEVKRMVADYRKPVVK
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    LATTLANGFTNGSHAAPTKSAAGPTSALRRTPGLDGHAAHQSQLEIVQELLSDPTDDVVE
                                                                                                                                                                                               {\tt NFQGTPIGVSMDNVRLAIASIGKLLFAQFSELVNDFYNNGLPSNLTASRNPSLDYGFKGA}
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          TSHRRTKQGGALQKELIRFLNAGI----
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       LSGYSLTVRDVVG-AARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSV--YGVTTGFGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              LQGYSGIRFEILEAITRLLNNNITPCLPLRGTITASGDLVPLSYIAGLLTGRPNSKA---
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       715
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              202
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       A,
                                                                                                                                                                                                                                                                           -KQDRYALRTSPQWLGPQIEVIRFSTKSIEREINSVNDNPLIDVSRNKAIHGG
    TTTYDLEPRWHDAFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAIS-
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              202
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     77918 MW;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             28.1%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         132;
                                                                                                                                                                                                                                                                                                                                                                                                                                Pred. No.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Score 1016;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     (By similarity).

DHA (2,3-DIDEHYDROALANINE)
(BY SIMILARITY).

5B9E837A6E8AF2B6 CRC64;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Mismatches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          -----FGNGTETCHTLPHSATRAAMLVRINTL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             .5e-60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                DB 1;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                . 715;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           68;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                a collaboration
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Gaps
                                                                                                                   517
                                                                                                                                                      535
                                                                                                                                                                                               457
                                                                                                                                                                                                                                                                                                                416
                                                                                                                                                                                                                                                                                                                                                                                           356
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         124
                                                                                                                                                                                                                                                                         397
                                                                                                                                                                                                                                                                                                                                                      342
                                                                                                                                                                                                                                                                                                                                                                                                                                  283
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            223
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   242
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          166
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 55
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      67
RESULT RESULT REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT OF THE STANDARD REPORT O
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       밁
                                                                            SEQUENCE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       STRAIN=CV.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               575
```

```
DT PAL2 ARATH

PA5724, Q94KC9, Q95CN5;

AC P45724, Q94KC9, Q95CN5;

DT 01-NOV-1995 (Rel. 32, Created)

DT 01-NOV-1995 (Rel. 41, Last sequence update)

DT 15-MAR-2004 (Rel. 43, Last annotation update)

DT 16-MAR-2004 (Rel. 43, Last annotation update)

DF Phenylalannine ammonia-lyase 2 (EC 4.3.1.5).

GN PAL2 OR AT3653260 OR T4D2.190.

OS Arabidopsis thaliana (Mouse-ear cress).

OC Eukaryota; Viridiplantae; Streptophyta; Embryophyta; Tracheophyta;

OC Spermatophyta; Magnoliophyta; eudicotyledons; core eudicots; rosids;

OC eurosids II; Brassicales; Brassicaceae; Arabidopsis.
                                                                                                                                                                                                                                                                                                                                        RA Salanoubat M., Lemcke K., Rieger M., Ansorge W., Unseld M.,
RA Fartmann B., Valle G., Bloecker H., Perez-Alonso M., Obermaier B.,
RA Delseny M., Boutry M., Grivell L.A., Mache R., Puigdomenech P.,
RA De Simone V., Choisne N., Artiguenave F., Robert C., Brottier P.,
RA De Simone V., Choisne N., Artiguenave F., Robert C., Brottier P.,
RA Wincker P., Cattolico L., Weissenbach J., Saurin W., Quetier F.,
RA Wincker P., Cattolico L., Weissenbach J., Saurin W., Quetier F.,
RA Wincker P., Cattolico L., Weissenbach J., Saurin W., Quetier F.,
RA Wincker P., Cattolico L., Weissenbach J., Saurin W., Quetier F.,
RA Wincker P., Cattolico L., Weissenbach J., Saurin W., Quetier F.,
RA Wincker P., Cattolico L., Weissenbach J., Saurin W., Quetier F.,
RA Wincker P., Cattolico L., Weissenbach J., Saurin W., Quetier F.,
RA Wincker P., Cattolico L., Weissenbach J., Simionati B.,
RA Wincker P., Cattolico L., Weissenbach J., Simionati B.,
RA Wincker P., Cattolico L., Wessen H., Holland R., Brandt P., Nyakatura G.,
RA Wincker P., Collado C., Perez-Perez A., Ottenwelder B., Duchemin D.,
RA Rooke R., Laudie M., Berger-Llauro C., Purnelle B., Masuy D.,
RA Mannhaupt G., Haase B., Schooff H., Rudd S., Zaccaria P., Mewes H.-W.,
RA Mannhaupt G., Haase D., Schooff H., Rudd S., Zaccaria P., Mewes H.-W.,
RA Mannhaupt G., Haase D., Schooff H., Rudd S., Zaccaria P., Mewes H.-W.,
RA Rooney T., Rizzo M., Walts A., Utterback T., Fujii C.y., Shea T.P.,
RA Rooney T., Riase D., Schooff H., Rudd S., Zaccaria P., Walte D., Peterson J., Van Aken S.,
RA Pai G., Militscher J., Sellers P., Gill J.E., Feldblyum T.V.,
RA Pai G., Militscher J., Sellers P., Gill J.E., Feldblyum T.V.,
RA Rooney T., Rizzo M., Matsumot M., Matsuno A., Muraki A.,
RA Masamura Y., Sarto S., Kato T., Asamizu E.,
RA Sasamoto S., Kandra M., Matsumoto M., Matsuno A., Muraki A.,
RA Matsanbe A., Yamdda M., Yasuda M., Tabata S.,

"Matsanbe A., Yamdda M., Yasuda M., Tabata S.,

"Matsanbe A., Matsa M., Washa S., Tabeuchi C., Wada T.,

"Matsanbe A., Washa S., Matsa M., Washa S., Matsa S., Mat
STRAIN=cv Columbia;
MEDLINE=22954850; PubMed=14593172;
Yamada K., Lim J., Dale J.M., Chen
Southwick A.M., Wu H.C., Kim C.J.,
                                                                                                                                                                                                                                                        "Sequence and analysis of thaliana.";
Nature 408:820-822(2000).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        MEDLINE=95195160; PubMed=7888622;
Wanner L.A., Li G., Ware D., Somssich
"The phenylalanine ammonia-lyase gene
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   MEDLINE=21016720; PubMed=11130713;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 SEQUENCE FROM N.A.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Plant Mol. Biol. 27:327-338(1995)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     SEQUENCE FROM N.A. STRAIN=cv. Columbia;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    EFDKVFTAMCQGKIIDPMLECL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    NVSRIYEAIKDGRINHVLVKML
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             LLPKEVESARAAYDSGNSAIDNKIKECRSYPLYKFVREELGTV-----LLTGEKVQSPGE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  -LTREVRN-REWQTPSSQAPAHAYLSPRTRVLYSFVREELGVQARRGDVFVGVQQETIGS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      FAYVDDPCSATYPLMQKLRQVF-----VDHALENGENEKNFSTSV-FQKIEAFEEELKA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Columbia;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    719
H., Shinn P., Palm
Nguyen M., Pham P.I
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      I.E., D
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Davis K.R.;
y in Arabidopsis
         . K., C
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  682
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       697
```

```
Ş
                                                                                                                       밁
                                                                                                                                                            á
                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                             멂
                                   뮍
                                                                           8
                                                                                                                                                                                                                                                                                                                                                                            Query Match
Best Local S
Matches 264
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             HSS; P261/1, 188F.
HSSP; P21310; 1B8F.
InterPro; IPR008948; L-Aspartase-like.
InterPro; IPR008948; Phe/His NH31yase.
InterPro; IPR008916; Phe_am_lyase.
Pfam; P900221; PAL; 1.
TIGRFAMs; TIGR01226; phe_am_lyase; 1.
PROSITE; PS00488; PAL HISTLDASE; 1.
PROSITE; PS00488; PAL HISTLDASE; 1.
Lyase; Phenlyropanoid metabolism; Multigene family.
Lyase; Phenlyropanoid metabolism; Multigene (Ala-Gly)
70. simidazolinone (Ala-Gly)
                                                                                                                                                                                                                                                                                                                                                                                                                                                            CONFLICT
CONFLICT
SEQUENCE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Karlin-Newmann G., Liu S.X., Lam B., Sakano H., Wu T., Yu G., Miranda M., Quach H.L., Tripp M., Chang C.H., Lee J.M., Toriumi M.J., Chan M.M., Tang C.C., Onodera C.S., Deng J.M., Akiyama K., Anaari Y., Arakawa T., Banh J., Banno P., Bowser L., Brooks S.Y., Carninci P., Chao Q., Choy N., Enju A., Goldsmith A.D., Gurjal M., Hansen N.F., Hayashizaki Y., Johnson-Hopson C., Hsuan V.W., Iida K., Karnes M., Khan S., Koesema E., Ishida J., Jiang P.X., Jones T., Kawai J., Kamiya A., Meyers C., Nakajima M., Narusaka M., Sekurai T., Satou M., Tamse R., Vaysberg M., Wallender E.K., Wong C., Yamamura Y., Yuan S., Shinozaki K., Davis R.W., Theologis A., Ecker J.R.; "Empirical analysis of transcriptional activity in the Arabidopsis
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               EMBL; L33678; AAC18871.1; -.
EMBL; AL132958; CAB64229.1; -.
EMBL; AF367308; AAK32895.1; -.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   the European Bioinformatics Institute. There are no restrictions on its use by non-profit institutions as long as its content is in no way modified and this statement is not removed. Usage by and for commercial entitles requires a license agreement (See http://www.isb-sib.ch/announce/or send an email to license@isb-sib.ch).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  genome.";
Science 302:842-846(2003)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        This SWISS-PROT entry is copyright. It is produced through a c
between the Swiss Institute of Bioinformatics and the EMBL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        -
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           MOD_RES
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          variety of natural products based on the phenylpropane skeleton. CATALYTIC ACTIVITY: L-phenylalanine = trans-cinnamate + NH(3). PATHMAY: Phenylpropanoid biosynthesis; first step.

SUBCELLULAR LOCATION: Cytoplasmic (Probable).

PTM: Contains an active site 4-methylidene-imidazole-5-one (MIO), which is formed autocatalytically by cyclization and dehydration of residues Ala-Ser-Gly (By similarity).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        SIMILARITY: Belongs to the PAL / histidase family.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              FUNCTION: This is a key enzyme of plant metabolism catalyzing the first reaction in the biosynthesis from L-phenylalanine of a wide
                                                                                                                                                                                                                                                                                                                                                                                 264;
                                                                                                                                                                 123
                                                                                                                                                                                                                                                   65
                                                                                                                                                                                                                                                                                                                                                                                                  Similarity
HEGTE-KIMFAREAISLFGLEA--VVLGPKEGLGLVNGTAVSASMATLSLHDSHMLSLLS
                                     LQGYSGIRFEILEAITSLLNHNISPSLPLRGTITASGDLVPLSYIAGLLTGRPNSKA---
                                                                  TRGHSAVRLVVLEALINFLNHRITPIVPLRGSISASGDLSPLSYIAGAITGHPDVKVHVL
                                                                                                                         GATSHRRTKNGTALQTELIRFLNAGI-----FGNTKETCHTLPQSATRAAMLVRVNTL
                                                                                                                                                                 GGSADTRTEDAVSLOKALIEHQLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIRVNSL
                                                                                                                                                                                                           VVNLGGETLTIGQVAAISTVGGSVKVELAETSRAGVKASSDWVMESMNKGTDSYGVTTGF
                                                                                                                                                                                                                                                   VVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSV--YGVTTGF
                                                                                                                                                                                                                                                                                             MDQIEAMLCGGGEKTKVAVTTKTLADPLNW-----GLAADQMKGSHLDEVKKMVEEYRRP
                                                                                                                                                                                                                                                                                                                                  LDSLATTLANGFINGSHAAPTKSAAGPTSALRRTPGLDGHAAHQSQLEIVQELLSDPTDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                            206
235
717
                                                                                                                                                                                                                                                                                                                                                                                 Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                AA;
                                                                                                                                                                                                                                                                                                                                                                                                                                                              206 I
235 A
77859 MW;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                204
                                                                                                                                                                                                                                                                                                                                                                                                  28.1%;
36.0%;
                                                                                                                                                                                                                                                                                                                                                                                 140;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                              (By Similarity).

DHA (2,3-DIDEHYDROAL!
(BY SIMILARITY).

D -> H (IN REF. 1).

A -> E (IN REF. 1).
                                                                                                                                                                                                                                                                                                                                                                            Score 1015.5; DB
Pred. No. 2.8e-60;
0; Mismatches 284
                                                                                                                                                                                                                                                                                                                                                                                                                                                                360A206295AF787D CRC64;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  (2,3-DIDEHYDROALANINE)
                                                                                                                                                                                                                                                                                                                                                                                                                      DB 1; Length 717;
                                                                                                                                                                                                                                                                                                                                                                                 Indels
                                                                                                                                                                                                                                                                                                                                                                                 45;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   a collaboration
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               outstation
                                                                                                                                                                                                                                                                                                                                                                               Gaps
                                                                                                                                                                                                                                                                                                 ហូ
                                                                                                                                                                                                                                                                                                                                       64
```

```
Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Дb
                                                                                                                                                                                                   Submitted (NOV-1997) to the EMBL/GenBank/DDBJ databases.

- FUNCTION: This is a key enzyme of plant metabolism catalyzing the first reaction in the biosynthesis from L-phenylalanine of a wide variety of natural products based on the phenylpropane skeleton.

- CATALYTIC ACTIVITY: L-phenylalanine = trans-cinnamate + NH(3).

- PATHWAY: Phenylpropanoid biosynthesis; first step.

- SUBCELLULAR LOCATION: Cytoplasmic (Probable).

- PTM: Contains an active site 4-methylidene-imidazole-5-one (MIO), which is formed autocatalytically by cyclization and dehydration of residues Ala-Ser-Gly (By similarity).

- SIMILARITY: Belongs to the PAL / histidase family.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                DIGLA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  PALY_DIGLA STANDARD; PRT; 713 AA. 023924; 15-JUL-1998 (Rel. 36, Created) 15-JUL-1998 (Rel. 36, Last sequence update) 10-OCT-2003 (Rel. 42, Last annotation update) phenylalanine ammonia-lyase (EC 4.3.1.5).
                               This SWISS-PROT entry is copyright. It is produced through a collaboration between the Swiss Institute of Bioinformatics and the EMBL outstation - the European Bioinformatics Institute. There are no restrictions on its use by non-profit institutions as long as its content is in no way modified and this scattement is not removed. Usage by and for commercial entities requires a license agreement (See http://www.isb-sib.ch/announce/or send an email to license@isb-sib.ch).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        NCBI_TaxID=49450;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Digitalis lanata (Foxglove).
Bukaryota; Viridiplantae; Streptophyta; Embryophyta; Tracheophyta;
Spermatophyta; Magnollophyta; endicotyledons; core endicots; asterids;
lamiids; Lamiales; Antirrhinaceae; Digitalideae; Digitalis.
EMBL; AJ002221; CAA05251.1; -.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                      SEQUENCE FROM N.A.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            580
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    593
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          539
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  463
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             479
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   403
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      343
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CEGKLIDPLMDCL 706
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           IAAYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GTPIGVSMDNTRLAIAAIGKLMFAQFSELVNDFYNNGLPSNLTASSNPSLDYGFKGAEIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         PLOKPKODRYALRTSPOWLGPOIEVIROATKSIEREINSVNDNPLIDVSRNKAIHGGNFO
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               DEGILRODRYPLRTSPOFLGPLVEDMMHAYSTLSLENNTTTDNPLLDVENKQTAHGGNFQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        EVLSAIFAEVMSGKP-EFTDHLTHRLKHHPGQIEAAAIMEHILDGSSY-MKLAQKVHEMD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                QALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEVKVKD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           -TGPDGESLTAKEAFEKAGISTGFFDLQPKEGLALVNGTAVGSGMASMVLFEANVQAVLA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              KDGRINHVLVKML 719
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        RAAYGNGTAPIPNRIKECRSYPLYRFVREELGTKLLTGEKVV----SPGEEFDKVFTAM
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            VDDPCSATYPLMQRLRQVIVDHALSNGETEKNAVTSI-FQKIGAFEEELKAVLPKEVEAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    DLEP--RWHDAFSYATGTVVE-LLSSSPSANVTLTAVNAWKVASAEKAIS--LTREVRNR
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     AVDLRAMELDEKKQEDPLLPTLLQQHLGTGLDVNALALEVKKALNKRL-----EQTTTY
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                MASYCSELQYLANPVTSHVQSAEQHNQDVNSLGLISSRKTSEAVDILKLMSTTFLVGICQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            ASAVSISMEKTRLALIGKLNFTQCTELLNAAMNRGLPSCL-AAEDPSLNYHGKGLDIH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               FWQTPSSQAPAHAYLSP-RTRVLYSFVREELGVQARRGDVFVGVQQETIGSNVSRIYEAI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             AVDLRHLEENLRQTVKNTVSQVAKKVLTTGINGE---LHPSRFCEKDLLKVVDREQVFTY
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            592
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               538
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          462
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  478
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             402
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    419
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               693
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                638
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         647
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   579
```

```
RESULT
PALY CA
ID PA
AC P4
DT 01
                                                                                                                                                                                                                                                                                                                                                         8 B 8
                                                                                                                                                                    g
                                                                                                                                                                                             5
                                                                                                                                                                                                                                    용양
                                                                                                                                                                                                                                                                                                                                                                                                                                                                            유 성 유 성
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   멍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 á
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     당
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             멍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Query Match
Best Local S
Matches 256
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   HSSP; P21310; 188F.

InterPro; IPR008948; L-Aspartase-like.
InterPro; IPR001106; Phe/His NH3lyase.
InterPro; IPR005922; Phe_am_lyase.
Pfam; PP00221; PAL; 1.
TIGRPAMS; TIGR01226; Phe_am_lyase; 1.
PROSITE; PS00488; PAL HISTIDASE; 1.
PROSITE; PS00488; PAL HISTIDASE; 1.
Lyase; Phenylpropanoid metabolism; Mult
CROSSLNK 198 200 (By similar
    PALY CAMSI
P45726;
01-NOV-1995
01-NOV-1995
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                SEQUENCE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      80
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                RES
                                                                                                                                                                                                                                                                                       612
                                                                                                                                                                                                                                                                                                                                538
                                                                                                                                                                                                                                                                                                                                                                        583
                                                                                                                                                                    859
                                                                                                                                                                                                                                                                                                                                                                                                            503
                                                                                                                                                                                                                                                                                                                                                                                                                                                     523
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              443
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  463
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          383
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 404
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       324
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              344
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      265
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               284
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   208
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            227
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    148
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          109
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           167
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 256;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   95
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                ω
5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        49
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Similarity
                                                                                                                                                                                                      YSFVREELGVQARRGDVFVGVQQETIGSNVSRIYEAIKDGRINHVLVKML
                                                                                                                                                                                                                                                 ALKNGENEKNASTSIFOKIEAFEÄELKAVLPKEVESARVALEDGKPAIANRITECRSYPL
                                                                                                                                                                                                                                                                                                                         SQVAKRTLTTGVNGELHPSRFCELDLLRVVDREYVFAYVDDPCSATYPLMQKLRQVLVEH
                                                                                                                                                                                                                                                                                                                                                                        NKRLEQTTTYDLEPRWHDA------
                                                                                                                                                                                                                                                                                                                                                                                                          DILKLMSSTYLVALCQAIDLRHLE-----
                                                                                                                                                                                                                                                                                                                                                                                                                                                 DVLSLLLASHLYCTLQAVDLRAMELDFKKQFDPLLPTLLQQHLGTGLDVNALALEVKKAL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GRNPSLDYGFKGSEIAMASYCSELQFLANPVTNHVQSAEQHNQDVNSLGLISSRKTVEAL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 AEDPSLNYHGKGLDIHIAAYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEAN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      LIDVSRNKALHGGNFQGTFIGVSMDNSRLAIASIGKLMFAQFSELVNDFYNNGLFSNLSG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                LLDVENKQTAHGGNFQASAVSISMEKTRLALALIGKLNFTQCTELLNAAMNRGLESCLA-
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GSSY-VKAAQKMHEMDPLQKPKQDRYALRTSPQWLGPQIEVIRTATKMIEREINSVNDNP
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       GSSFAVEHEEEVKVKDDEGILRQDRYPLRTSPQFLGPLVEDMMHAYSTLSLENNTTTDNP
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  :---ESMNKGTDSYGVTTGFGATSHRRTKQGGALQKELIRFLNAGI---
                                                                                                                                                                                                                                                                                   -LLSSSPSANVTLTAVNAWKVASAEKAISLTREVRN-RFWQTPSSQAPAHAYLSPRTRVL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          MATLSLHDSHMLSLLSQALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 IAGAITGHPDVKVHVLHEGTEKIMFAREAISLFGLEAVV---LGPKEGLGLVNGTAVSAS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  PHSATRAAMLVRINTLLQGYSGIRFEILETITKFLNHNITPCLPLRGTITASGDLVPLSY
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       PLEVVRGAMVIRVNSLTRGHSAVRLVVLEALTNFLNHRITPIVPLRGSISASGDLSPLSY
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     AQLQNSV - - YGVTTGFGGSADTRTEDAVSLQKALIEHQLCGVTPTSXSSFSVGRGLENTL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              SHLDEVKRMVEEFRKTVVKLGGETLTISQVAATAARDNEVAVQLAESSRAGVKASSDWVM
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  SQLEIVQELLSDPTDDVVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLK
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 IAGLLTGRPNSKA-VGPNG--ESLNAEQAFKLAGANSGLFFELQPKEGLALVNGTAVGSG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            713
      (Rel.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    199
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            ΑA;
                                                                  STANDARD;
    32, Created)
32, Last sequence
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    199
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           28.1%; Sco
36.1%; Pre
ative 122;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            77732
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         metabolism; Multigene
5-imidazolinone
                                                                                                                                                                -NFLTGEKVMSPGEECDRVFTAMSKGLIVDPLLKCL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            3
3
3
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Score 1013.5; DB 1; Pred. No. 3.7e-60;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       (By similarity).
DHA (2,3-DIDEHYDROALANINE)
(BY SIMILARITY).
747CE64C65BDCC6A CRC64;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Mismatches
                                                                  714
                                                                  Š
                                                                                                                                                                                                                                                                                                                                                                    FSY-----ATGTVVE--
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         family.
(Ala-Gly)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Length
                                                                                                                                                                                                                                                                                                                                                                                                            ----ENLRLSVKNTI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             FGNGTESTHTL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               81;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Gaps
                                                                                                                                                                                                                                                                                                                                                                                                          537
                                                                                                                                                                                                                                                                                                                                                                                                                                                 582
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                522
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               462
                                                                                                                                                                                                                                                                                                                                                                    611
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         502
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      442
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       382
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            403
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    323
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   264
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         283
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                207
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      226
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             147
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     166
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              94
                           Ş
                                                                                 밁
                                                                                                                   8
                                                                                                                                                             맑
                                                                                                                                                                                                Ş
                                                                                                                                                                                                                                            밁
                                                                                                                                                                                                                                                                          Ş
                                                                                                                                                                                                                                                                                                                           뮹
                                                                                                                                                                                                                                                                                                                                                                Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         STEET AND CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRACTOR OF CONTRA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        RC STRAIN=cv. Yabukita; TISSUE=Leaf;
RA Matsumoto S., Takeuchi A., Hayatsu M., Kondo S.;
RA Matsumoto S., Takeuchi A., Hayatsu M., Kondo S.;
RT "Molecular cloning of phenylalanine ammonia-lyase cDNA and classification of varieties and cultivars of tea plants (Camellia RT classification of varieties and cultivars of tea plants (Camellia Sinensis) using the tea PAL cDNA probe.";
RI Theor. Appl. Genet. 89:671-675(1994).
CC first reaction in the biosynthesis from L-phenylalanine of a wide concept of a transparent control of the partition of a wide concept of the products based on the phenylapropane skeleton.
CC variety of natural products based on the phenylapropane skeleton.
CC i-carmiytic Activity: L-phenylalanine = trans-cinnamate + NH(3).
CC -i- PATHWAY: Phenylpropanoid biosynthesis; first step.
CC -i- PUMC. Contains an active site 4-methylidene-imidazole-5-one (MIO), which is formed autocatalyrically by cyclization and dehydration of residues Ala-Ser-Gly (By similarity).
CC -i- SIMILARITY: Belongs to the PAL / histidase family.
                                                                                                                                                                                                                                                                                                                                                                                                        Query Match
Best Local S
Matches 268
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        This SWISS-PROT entry is copyright. It is produced through a collaboration between the Swiss Institute of Bioinformatics and the EMBL outstation the European Bioinformatics Institute. There are no restrictions on its use by non-profit institutions as long as its content is in no way modified and this statement is not removed. Usage by and for commercial entities requires a license agreement (See http://www.isb-sib.ch/announce/or send an email to license@isb-sib.ch).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   InterPro; IPR008948; L-Aspartase-like.
InterPro; IPR001106; Phe/His NH3lyase.
InterPro; IPR005922; Phe am lyase.
Pfam; PF00221; PAL; 1.
TIGRFAMS; TIGR01226; Phe am lyase; 1.
PROSITE; PS00488; PAL; HISTIDASE; 1.
PROSITE; PS00488; PAL; HISTIDASE; 1.
Lyase; Phenylpropanoid metabolism.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         SEQUENCE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           MOD_RES
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                EMBL; D26596; BAA05643.1; -. HSSP; P21310; 1B8F.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Eukaryota; Viridiplantae; Stro
Spermatophyta; Magnoliophyta;
Ericales; Theaceae; Camellia.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     SEQUENCE FROM N.A.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Phenylalanine
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    10-OCT-2003 (Rel.
    223
                                        241
                                                                                 164
                                                                                                                       181
                                                                                                                                                             113
                                                                                                                                                                                                    123
                                                                                                                                                                                                                                                                                                                                                                                                        268;
                                                                                                                                                                                                                                            53
                                                                                                                                                                                                                                                                                   65
                                                                                                                                                                                                                                                                                                                                                                    ຫ
                                                                                                                                                                                                                                                                                                                                                                                                                              Similarity
MDS-TTAIGNGV--GSGGSPGFCLKDPLNW----
                                                                                                                                                                                                                                                                                                                                                                    LDSLATTLANGFTNGSHAAPTKSAAGPTSALRRTPGLDGHAAHQSQLEIVQELLSDPTDD
                                                                                                                                                             GATSHRRTKEGGALQKELIRFLNAGI-----FGNGTESCHTLPQSATRAAMLVRIN
                                                                                                                                                                                                    GGSADTRTEDAVSLQKALIEHQLCGVTPTSXSSFSVGRGLE--NTLPLEVVRGAMVIRVN
                                                                                                                                                                                                                                          VVRLGGETLTISQVAAIAVRGSEVAVELSESAREGVKASSDWVMESMNKGTDSYGVTTGF
                                                                                                                                                                                                                                                                                 VVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSV--YGVTTGF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       714 AA;
                                                                                                                                                                                                                                                                                                                                                                                                        Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                201
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        200
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Rel. 42, Last ammonia-lyase
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    42,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           (Tea).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                201
                                                                                                                                                                                                                                                                                                                                                                                                                           28.0%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         77751 MW;
                                                                                                                                                                                                                                                                                                                                                                                                        130;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Streptophyta; Embryophyta; Tracheophyta;
/ta; eudicotyledons; core eudicots; aster
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 annotation e (EC 4.3.1
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     (By similarity).
DHA (2,3-DIDEHYDROA)
(BY SIMILARITY).
(SF0EC7E8DOAB9071 of
                                                                                                                                                                                                                                                                                                                                                                                                                           Score 1012; DB 1;
Pred. No. 4.7e-60;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    5-imidazolinone (Ala-Gly)
                                                                                                                                                                                                                                                                                                                                                                                                        Mismatches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                (2,3-DIDEHYDROALANINE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 n update)
L.5).
                                                                                                                                                                                                                                                                                                                                                                                                        280;
                                                                                                                                                                                                                                                                                                                           -GVAAEAMKGSHLEEVKGMVEEFRKP
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CRC64;
                                                                                                                                                                                                                                                                                                                                                                                                                                            Length
                                                                                                                                                                                                                                                                                                                                                                                                        Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                               714;
                                                                                                                                                                                                                                                                                                                                                                                                        62;
```

298 222 240 163 180 64

```
PALL SOYEN

ID PALL S
AC P77951
DT 01-AUG
DT 01-AUG
DT 01-AUG
DT 01-AUG
DT 01-AUG
CO ELAKRY
OC SPERMA
OC WCBL
TRANK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA FEARK
RA F
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       멂
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      PALL SOYBN
PALL SOYBN
PALL SOYBN
PALL SOYBN
PACT 1991;
PACT 1992 (Rel. 23, Created)
PACT 101-AUG-1992 (Rel. 23, Last sequence update)
PACT 100-CCT-2003 (Rel. 42, Last annotation update)
PACT 100-CCT-2003 (Rel. 42, Last annotation update)
PACT 100-CCT-2003 (Rel. 42, Last annotation update)
PACT 100-CCT-2003 (Rel. 42, Last annotation update)
PACT 100-CCT-2003 (Rel. 42, Last annotation update)
Bukaryota; Viridiplantae; Streptophyta; Embryophyta; Tracheophyta;
Spermatophyta; Magnoliophyta; eudicotyledons; core eudicots; roside
eurosids_I; Fabales; Fabaceae; Papilionoideae; Phaseoleae; Glycine
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              MEDLINE=92190550; PubMed=1799682;
Frank R.L., Vodkin L.O.;
"Sequence and structure of a phenylalanine ammonia-lyase gene
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Glycine max."
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     SEQUENCE FROM N.A.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           STRAIN=cv.
                                                                                                                                                                                                                                                                       Seq. 1:335-346(1991).

FUNCTION: This is a key enzyme of plant metabolism catalyzing the first reaction in the biosynthesis from L-phenylalanine of a wide variety of natural products based on the phenylpropane skeleton. CAPTALYTIC ACTIVITY: L-phenylalanine = trans-cinnamate + NH(3).

PATHWAY: Phenylpropanoid biosynthesis first step:

SUBCELLULAR LOCATION: Cytoplasmic (Probable).

PYN: Contains an active site 4-methylidene-imidazole-5-one (MIO), which is formed autocatalytically by cyclization and dehydration of residues Ala-Ser-Gly (By similarity).

SIMILARITY: Belongs to the PAL / histidase family.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          576
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       684 DKVFTÄLCKGEMIDPLMDCL 703
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  700
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            641
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 519
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               538
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          459
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    399
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              339
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   299
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          YIDDPCSATYPLMQKLRQ--
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               QAVDIRAMEIDFKKQFDPLLPTLLQQHLGTGLDVNALALEVKKALNKRLEQ------
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              AMAAYCSELOFLANPVINHVOSAEQHNODVNSLGLISSRKTAEAVDILKLMSSTYLVALC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      HIAAYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     QASAVSISMEKTRLALIGKLNFTQCTELLNAAMNRGLPSCLA-AEDPSLNYHGKGLDI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       SEVISAIFAEVMQGKP-EFTDHLTHKLKHHPGQIEAAAIMEHILDGSSY-VKAAQKLHEM
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               SQALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEVKVK 358
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      SRIYEAIKDGRINHVLVKML
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             PKEVESTRAAIENGNSAIPNRIKECRSYPLYKFVREELGT----ELLTGEKVRSPGEEF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         TREVAN-RFWQTPSSQAPAHAYLSPRTRVLYSFVREELGVQARRGDVFVGVQQETIGSNV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      ----TTTYDLEPRWHDAFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAIS--L
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 QAVDLRHFEENLRNTVKSTVSQVAKRVLTMG---VNG-ELHPSRFCEKDLLRVVDREYIFA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    QGTPIGVSMDNTRLAVASIGKLMFAQFSELVNDFYNNGLPSNLSGGRNPSLDYGFKGAEI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           DPLQKPKQDRYALRTSPQWLGPLIEVIRSSTKSIEREINSVNDNPLINVSRNKALHGGNF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         DEGILRODRYPLRTSPOFLGPLVEDMMHAYSTLSLENNTTTDNPLLDVENKOTAHGGNF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    T225; TISSUE=Leaf;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      719
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              ----VLVEHALKNGESEKNLSTSIFQKIRAFEEEIKTLL
                                                                                                         long as its content is in no way moved. Usage by and for commercial (See http://www.isb-sib.ch/announce/
                                                                                                                                                                                                                                      gh a collaboration -
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  from
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       575
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           458
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                418
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              518
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            537
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       683
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          628
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         640
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   588
```

```
Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            STITING CREEK CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORRESPONDED CORR
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          ₽,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             맑
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                      á
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Вb
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      뫄
                                                                       B
                                                                                                                                                   Ş
                                                                                                                                                                                                                                       В
                                                                                                                                                                                                                                                                                                  S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Query Match
Best Local Simi
Matches 270;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      InterPro; LFAVVII PAL; 1.
Pfam; PF00221; PAL; 1.
TIGRFAMs; TIGR01226; phe am lyase; 1.
PROSITE; PS00488; FAL HISTIDASE; 1.
PROSITE; PS0048
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           MOD_RES
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            EMBL; X52953; University S22991; S22991.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            SEQUENCE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       or send an email to license@isb-sib.ch)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             InterPro; IPR008948; L-Aspartase-like.
InterPro; IPR001106; Phe/His NH3lyase.
InterPro; IPR005922; Phe am lyase.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           HSSP; P21310; 1B8F
                                                                                                                                                                                                                                                                                                                           605
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   545
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               465
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               485
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          405
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      426
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      345
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      366
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      291
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              231
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          174
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           X52953; CAA37129.1;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             43
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     14
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             74
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Similarity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     EILEAITKLLNNNVTPCLDLRGTITASGDLVPLSYIAGLLTGRPNSKA-VGPSG--EVLN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         QGGALQKELIRFLNAGI-----FGNGTESSHTLPHTATRAAMLVRINTLLQGYSGIRF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             DAVSLOKALIEHOLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIRVNSLTRGHSAVRL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     TVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSV--YGVTTGFGGSADTRTE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         NGHONGSFCLST--AKGNNDPLNW--GAAAEAMKGSHLDEVKRMVAEYRKPVVRLGGETL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     NGFTNGSHAAPTKSAAGPTSALRRTPGLDGHAAHQSQLEIVQELLSDPTDDVVELSGYSL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               VVLEALTNFLNHRITPIVPLRGSISASGDLSPLSYIAGAITGHPDVKVHVLHEGTEKIMF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      ELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQAVDLRA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  SMEKTRIALIGKINFTQCTELLNAAMNRGLPSCL-AAEDPSLNYHGKGLDIHIAAYAS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  QDRYALRTSPOWLGPLIEVIRFSTKSIEREINSVNDNPLIDVSRNKALHGGNFQGTPIGV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              MOGKP-EPTDHLTHKLKHHPGQIEAAAIMEHILDGSSYMKAAKKLHEIDPLQKP-----K 344
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          AREAISLEGL--EAVVIGEREGIGLYNGTAVSASMATISLHDSHMISLISQALTALTVEA 309
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             TIAQVAAVAGHDHGVAVELSESAREGVKASSEWVMNSMNNGTDSYGVTTGFGATSHRRTK
DGRINHVLVKML 719
                                                                               AAYESGKAAIPNKIQECRSYPLYKFVREELGT---
                                                                                                                                                           WQTPSSQAPAHAYLSP-RTRVLYSFVREELGVQARRGDVFVGVQQETIGSNVSRIYEAIK
                                                                                                                                                                                                                                           IDDPCSATYPLMQKLRQVLVDHALVNAECEKDVNSSIFQKIAIFEEELKNLLPKEVEGAR
                                                                                                                                                                                                                                                                                                                           ---ATGTVVELLSSSPSANVTLTAVNA-----
                                                                                                                                                                                                                                                                                                                                                                                                       LEENLKNSVKNTVSQVSKRILTTG--VNG-ELHPSRFCEKDLLKVVDREY-----IFSY
                                                                                                                                                                                                                                                                                                                                                                                                                                                                          MELDFKKQFDPLLPTLLQQHLGTGLDVNALALEVKKALNKRLEQTTTYDLEPRWHDAFSY
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               SMDNTRLALASIGKLMFAQFSELVNDFYNNGLPSNLTASRNPSLDYGFKGAEIAMASYCS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              MVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVE----HEEEVKVKDDEGILR
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  AKEAFELASINSEFFELOPKEGLALVNGTAVGSGLASMVLFEANILAVLSEVLSAIFAEV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            713 AA;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Conservative 120; Mismatches 282;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            200
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            200
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            77744 MW;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          28.0%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Score 1011; DB 1;
Pred. No. 5.5e-60;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          (By similarity).
DHA (2,3-DIDEHYDROALANINE)
(BY SIMILARITY).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     9D71EF1CC230216A
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     DB 1;
                                                                                        ---GLLTGEKVRSPGEEFDKLFTAMC
                                                                                                                                                                                                                                                                                                                               -WKVASAEKAIS--LTREVRNRF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CRC64;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         60;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   425
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          365
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      290
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               604
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           524
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       544
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       484
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               404
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             73
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       464
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             19
```

**OCKIIDPLMECL** 

Search completed: September 9, 2004, 10:04:39 Job time : 19.4315 secs

```
Title:
Perfect score:
Sequence:
                                                                                                                                                                                                                                                                                                                          Post-processing: Minimum Match 0%
Maximum Match 100%
Listing first 45 summaries
                                                                                                                                                                                                                                                                                                                                                                                             Minimum DB seq length: 0
Maximum DB seq length: 2000000000
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Scoring table:
                                                                                                                                                                                                                                                                                              Database :
                                                                                                                                                                                                                                                                                                                                                                                                                                                 Total number of hits satisfying chosen parameters:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Run on:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    OM protein - protein search, using sw model
   SPTREMBL 25:*

1: sp_acchea:*
2: sp_bacteria:*
3: sp_fungd:*
4: sp_human:*
5: sp_mammal:*
7: sp_mhc:*
9: sp_phage:*
10: sp_plant:*
11: sp_virus:*
12: sp_virus:*
13: sp_virus:*
14: sp_virus:*
15: sp_bacteriap:
16: sp_bacteriap:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1017041 seqs, 315518202 residues
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   BLOSUM62
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 US-09-939-408A-13
3610
1 MAPSIDSIATTLANGFINGS.....RIYEAIKDGRINHVLVKMLA 720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   September 9, 2004, 09:57:28; Search time 87.6349 Seconds (without alignments) 2592.269 Million cell updates/sec
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Gapop 10.0 , Gapext 0.5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    GenCore version 5.1.6
Copyright (c) 1993 - 2004 Compugen Ltd.
                                                                                                                     sp_mammal:*
sp_mhc:*
sp_organelle:*
sp_phage:*
sp_phage:*
sp_plant:*
sp_rodent:*
sp_virus:*
sp_vertebrate:*
sp_unclassified:*
sp_rvirus:*
sp_bacteriap:*
sp_archeap:*
                                                                                                                                                                                                            sp_invertebrate:*
                                                                                                                                                                                                                                                                                                                                                                                                                                                     1017041
```

Pred. No. is the number of results predicted by chance to have a score greater than or equal to the score of the result being printed, and is derived by analysis of the total score distribution.

u,	3
5	i
15	5
÷	:
ķ	,
i	1
Į.	t

15 997 27. 16 994 27.	14 997.5 27.	13 998 27.	12 1002.5 27.	11 1003.5 27.	10 1007.5 27.		8 1013 28.1		6 1016.5 28.	5 1016.5 28.2	4 1018 28.	3 1025 28.4	2 1031.5 28.6		Result Query	oko	
6 716 5 717	6 703	6 713	8 721	8 671					2 717						Length		
10 Q9ATN	10 Q8VXG	10 QBGZR	10 Q9XFX	10 Q84VE	10 Q7X6M	10 Q8H6V6	10 0852	10 Q94EN	10 Q8RWP	10 Q7X7G	10 Q9AXI	10 Q8W2E4	10 Q9M567	10 Q94AN	DB ID		'n
WO QBh6w0 coffea cane	7 Q8vxg7	1R8 Q8gzr8 lactuca sat	Q9xfx5	Q84ve0	3 Q7x6m8	Q8h6v6	Q852s1	Q94en0	Q8rwp4	3 Q7x7g3	5 Q9axi5	E4 Q8w2e4 lactuca sat		Q94an1	Description		ST NAME OF THE STATE OF THE STA

## ALIGNMENTS

ELLTGEKVTS

694 635 638

583

rosids;

```
Characterization.";

Submitted (MAY-2003) to the EMBL/GenBank/DDBJ databases.

REMBL; AY045919; AAK76593.1; -.

REMBL; BT003330; AAC29949.1; -.

REMBL; AY079363; AAF185094.1; -.

REMBL; AY303128; AAP59438.1; -.

REMBL; AY303128; AAP59438.1; -.

RPIR; G84787; G84787.

RPIR; G84787; G84787.

RGO; G0:0016737; C:cytoplasm; IEA.

RGO; G0:001681; F:ammonia ligase activity; IEA.

RGO; G0:001681; F:ammonia-lyase activity; IEA.

RGO; G0:0016829; F:lyase activity; IEA.

RGO; G0:0016829; F:lyase activity; IEA.

RGO; G0:0006593; P:biosynthesis; IEA.

RGO; G0:0006595; P:phepsylalanine catabolism; IEA.

RGO; G0:0006595; P:phepsylalanine catabolism; IEA.

R InterPro; IPR008948; L-Aspartase-like.

R INTERPAMS; TIGR01226; phe am lyase.

R PFGMT; PS00221; PAL; 1

TIGRPAMS; TIGR01226; phe am lyase; 1.

R PROSITES; PS00488; PAL; HISTIDASE; 1.

W Hypothetical protein; Lyase.

SEQUENCE 725 AA; 78725 MW; 0262653B2DEFE9CE CRC64;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Matches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Query Match
Best Local
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Cochrane F.C., Kim M.R., Cardenas C.L., Davin L.B., Lewis N.G., "Putative PAL multigene family in Arabidopsis thaliana: Kinetic Characterization of Recombinant Proteins and Knock-out Mutant
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Toriumi M., Yu G., Brooks S., Chao Q., Chen H., Kar Kim C., Lam B., Miranda M., Nguyen M., Palm C.J., Sl. Southwick A., Davis R.W., Ecker J.R., Theologis A.; "Arabidopsis Open Reading Frame (ORF) Clones."; Submitted (FEB-2002) to the EMBL/GenBank/DDBJ databy
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      SEQUENCE FROM N.A.
                                                         467
                                                                                                             475
                                                                                                                                                                    407
                                                                                                                                                                                                                        416
                                                                                                                                                                                                                                                                            347
                                                                                                                                                                                                                                                                                                                                356
                                                                                                                                                                                                                                                                                                                                                                                         289
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 233
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        239
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         173
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                179
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    120
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     119
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 272;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          18
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         4
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Similarity 36.5
72; Conservative
                                                                                                                                                                                                                                                                            HEMDPLQKPKQDRYALRTSPQWLGPQIEVIRYATKSIERBINSVNDNPLIDVSRNKAIHG
                                                                                         LDIHIAAYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLY
                                                                                                                                                              GNFQGTPIGVSMDNTRLAIAAIGKLMFAQFSELVNDFYNNGLPSNLTASRNPSLDYGFKG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CTLQAVDLRAMELDFKKQFDPLLPTLLQQHLGTGLDVNALALEVKKALNKRL----
                                                         AEIAMASYCSELQYLANPVTSHVQSAEQHNQDVNSLGLISSRKTSEAVDILKLMSTTFLV
                                                                                                                                                                                        GNFQASAVSISMEKTRLALALIGKLNFTQCTELLNAAMNRGLPSCL-AAEDPSLNYHGKG
                                                                                                                                                                                                                                                                                                                             KVKDDEGILRODRYPLRTSPOFLGFLVEDMMHAYSTLSLENNTTTDNPLLDVENKQTAHG
                                                                                                                                                                                                                                                                                                                                                                                    SVLAEILSAVFAEVMSGKP-EFTDHLTHRLKHHPGQIEAAAIMEHILDGSSY-MKLAQKL
                                                                                                                                                                                                                                                                                                                                                                                                                SLLSQALTALTVEAMVGQQGSFAPFIHDVCR?HPGQVEVARNIRTLLSGSSFAVEHEEEV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              TTGFCATSHRRTKNGVALQKELIRFLNAGI-----FGSTKETSHTLPHSATRAAMLVR
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 TTGFGGSADTRTEDAVSLQKALIEHQLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIR 178
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        PTDDVVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDXSVDFLKAQLQNSV--YGV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   NGAH----KSNGGGVDAMLCGGDIKTKNMVINAEDPLNWGAAAEQMKGSHLDEVKRMVAE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          NGSHAAPTKSAAGPTSAL--------RRTPGLDGHAAHQ---SQLEIVQELLSD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            FRKPVVNLGGETLTIGQVAAISTIGNSVKVELSETARAGVNASSDWVMESMNKGTDSYGV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        28.9%; Score 1041.5;
36.5%; Pred. No. 3.2e
tive 138; Mismatches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  .5; DB 10; Length
}.2e-61;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              258; Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       databases.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               databases
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Karlin-Neumann
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Shinn
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        .
.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           77;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  <u>ه</u>
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Gaps
  ġ
                                                                                                          534
                                                                                                                                                                 466
                                                                                                                                                                                                                  474
                                                                                                                                                                                                                                                                            406
                                                                                                                                                                                                                                                                                                                             415
                                                                                                                                                                                                                                                                                                                                                                              346
                                                                                                                                                                                                                                                                                                                                                                                                                                        355
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           288
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      232
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          238
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             118
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         119
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   59
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            RESULT OF SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND SECOND
                                        δ
                                                                                                       밁
                                                                                                                                                     δ
                                                                                                                                                                                                            B
                                                                                                                                                                                                                                                                Ş
                                                                                                                                                                                                                                                                                                                             B
                                                                                                                                                                                                                                                                                                                                                                        Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                                                                                                     Query Match
Best Local S
Matches 268
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     "The phenylalarine ammonia-lyase gene family in raspberry.

T expression, and evolution.";

L Plant Physiol. 177:230-239(2001).

R EMBL; AF237955; AAF40224.1; -.

R GG; GG:0005737; C:cytoplasm; IEA.

R GG; GG:0016211; F:ammonia ligase activity; IEA.

R GG; GG:0016211; F:ammonia ligase activity; IEA.

R GG; GG:0016839; F:lyase activity; IEA.

R GG; GG:00045548; F:phenylalanine ammonia-lyase activity; IEA.

R GG; GG:000558; P:biosynthesis; IEA.

R GG; GG:000558; P:biosynthesis; IEA.

R GG; GG:000559; P:phenylalanine catabolism; IEA.

R GG; GG:0006559; P:phenylalanine catabolism; IEA.

R InterPro; IPR008348; L-Aspartase-like.

InterPro; IPR00116; Phe/His_NH3lyase.

R InterPro; IPR00116; Phe-am_lyase.

R InterPro; IPR001226; Phe-am_lyase; 1.

R PROSITE; PS00488; PAL_HISTIDASE; 1.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Pfam; Province TIGREAMS; TIGREAMS; TIGREAMS; FIGREAMS; F
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Lyase.
SEQUENCE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Q9M567;
01-OCT-2000
01-OCT-2000
01-OCT-2003
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             SEQUENCE FROM N.A.
MEDLINE=21437948; PubMed=11553751;
Kumar A., Ellis B.E.;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Rubus idaeus (Raspberry).

Eukaryota; Viridiplantae; Streptophyta; Embryophyta; Tracheophyta;

Spermatophyta; Magnoliophyta; eudicotyledons; core eudicots; rosid:

eurosids I; Rosales; Rosaceae; Rosoideae; Rubus.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             NCBI_TaxID=32247;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            01-OCT-2000 (TrEMBLrel. 15,
01-OCT-2000 (TrEMBLrel. 15,
01-OCT-2003 (TrEMBLrel. 25,
Phenylalanine ammonia-lyase
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Q9M567
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    N
  186
                                                   187
                                                                                                          133
                                                                                                                                                              127
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            695
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                636
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     527
                                                                                                                                                                                                                  73
                                                                                                                                                                                                                                                                      69
                                                                                                                                                                                                                                                                                                                             13
                                                                                                                                                                                                                                                                                                                                                                              14
                                                                                                                                                                                                                                                                                                                                                                                                                                                               Similarity
SGIREEILEAISKFLNHNITPCLPLRGTITASGDLVPLSYIAGLLTGRPNSKA-
                                                                                                                                                   DTRTEDAVSLQKALIEHQLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIRVNSLTRGH
                                                                                                                                                                                                                  GGETLTISQVAAIANHDSGVKVELAESARAGVKASSDWVMDSMNKGTDSYGVTTGFGATS
                                                                                                                                                                                                                                                                                                                             NGIQNGSLDDGLCIKTESIKTGYSVSDPLNWGAAAESMTGSHLDEVRRMVAEYRKPVVKL
                                                                                                                                                                                                                                                                                                                                                                              NGFTNGS--HAAPTKSAAGPTSALRRTPGLDGHAAHQ---SQLEIVQELLSDPTDDVVEL
                                                   SAVRLVVLEALTNFLNHRITPIVPLRGSISASGDLSPLSYIAGAITGHPDVKVHVLHEGT
                                                                                                                                                                                                                                                                   SGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSV--YGVTTGFGGSA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           S--LTREVR---NREWQTPSSQAPAHAYLSPRTRVLYSFVREELGVQARRGDVFVGVQQET
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  AICQAVDLRHLEENLRQTVKNTVSQVAKKVLTTG--VNG-ELHPSRFCEKDLLKVVDREQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     PGEEFDKVFTAI CEGKI I DPMMECL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         IGSNVSRIYEAIKDGRINHVLVKML
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                KAVLPKEVEAARAAYDNGTSAIP-NRIKECRSYPLYRFVREELGT---
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        VYTYADDP----
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               TTTYDLEPRWHDAFSYATGTVVE------LLSSSPSANVTLTAVNAWKVASAEKAI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               730 AA;
                                                                                                                                                                                                                                                                                                                                                                                                                                        Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            79422 MW;
                                                                                                                                                                                                                                                                                                                                                                                                                                                               28.6%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        -- CSATYPLIQKLRQVIVDHALINGESEKNAVTSIFH--KIGAFEEEL
                                                                                                                                                                                                                                                                                                                                                                                                                                     130;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Created)
Last sequence update)
Last annotation update)
2 (EC 4.3.1.5).
                                                                                                                                                                                                                                                                                                                                                                                                                                                               Score 1031.5; DB Pred. No. 1.5e-60;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               0E942417E50CE113
                                                                                                                                                                                                                                                                                                                                                                                                                                     Mismatches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        714
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            719
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                730
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                $
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         DB 10; Length
                                                                                                          -AHTLPHSATRAAMLVRINTLLOGY
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               CRC64;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        raspberry. structure,
                                                                                                                                                                                                                                                                                                                                                                                                                                     Indels
```

뭐 5 멍 Ś B

δδ Ω 8 В 5 B 8 В Ş В Ş В δ

49;

Gaps

17;

126

72

186 132

185

```
RESULTION AND CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL OF THE CONTROL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 g
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               뭥
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             δδ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Š
                                                                     Submitted (Aug-2000) to the EMBL/GenBank/DDBJ date EMBL; AF299330; AAL55242.1; ---
GO; GO:0005737; C:cytoplasm; IEA.
GO; GO:0016211; F:ammonia ligase activity; IEA.
GO; GO:001621; F:ammonia-lyase activity; IEA.
GO; GO:0016841; F:ammonia-lyase activity; IEA.
GO; GO:0016829; F:lyase activity; IEA.
GO; GO:0009058; F:blosynthesis; IEA.
GO; GO:0009058; F:blosynthesis; IEA.
GO; GO:0009058; F:blosynthesis; IEA.
GO; GO:0009058; F:blosynthesis; IEA.
GO; GO:0009058; F:blosynthesis; IEA.
GO; GO:0009058; F:blosynthesis; IEA.
GO; GO:0009058; F:blosynthesis; IEA.
GO; GO:0009058; F:blosynthesis; IEA.
GO; GO:0009058; F:blosynthesis; IEA.
GO; GO:0009058; F:blosynthesis; IEA.
GO; GO:001625; F:blosynthesis; IEA.
GO; GO:001625; F:blosynthesis; IEA.
InterPro; IPR001105; P:blosynthesis; National State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. State (Aug. S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      01-MAR-2002 (TrEMBLrel. 20, Created)
01-MAR-2002 (TrEMBLrel. 25, Last sequence update)
01-OCT-2003 (TrEMBLrel. 25, Last annotation update)
Phenylalanine ammonia-lyase.
Lactuca sativa (Garden lettuce).
Eukaryota; Viridiplantae; Streptophyta; Embryophyta; Tracheophyta;
Spermatophyta; Magnoliophyta; eudicotyledons; core eudicots; aster:
campanulids; Asterales; Asteraceae; Cichorioideae; Cichorieae;
        PROSITE;
Lyase
SEQUENCE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 SEQUENCE FROM N.A.

Campos-Vargas R., Nonogaki H., Suslow T.,

"Characterization of phenylalanine ammonia

lettuce leaf tissue.";
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Q8W2E4
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 592
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   541
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    481
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             484
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                421
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  425
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              365
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                303
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             EKIMFAREAISLFGLEA--VVLGPKEGLGLVNGTAVSASMATLSLHDSHMLSLLSQALTA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           SELQFLANPVINHVQSAEQHNQDVNSLGLISSRKTAEAVDILKLNSSTFLVALCQAIDLR
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               SELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQAVDLR
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               ISMEKTRLALALIGKLNFTQCTELLNAAMNRGLFSCLA-AEDFSLNYHGKGLDIHIAAYA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   AYESGNAAIPNRIVECRSYPLYKFVREELG-----GEFLTGEKVRSPGEECDKVFTAMCQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          YDLEPRWHDAFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAIS--LTREVRN-RF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               HLEENLKSTVKNTVSQLAKRVLTTGVNGELHPSRFCEKDLLMVVEREYLFAYIDDPCSAT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 AMELDEKKQFDPLLPTLLQQHLGTGL------DVNALALEVKKALNKRLEQ--TTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    VSMDNTRLAIASIGKLMFAQFSELVNDFYNNGLPSNLSGGRDPSLDYGFKGAEIAMASYC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    KÓDRÝALRTSPÓWLGPOIEVIRFSTKSIEREINSVNDNPLIDVSRNKALHGGNFOGTPIG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     RODRYPLRTSPOFLGPLVEDMMHAYSTLSLENNTTTDNPLLDVENKQTAHGGNFQASAVS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            I FABVMQGKP-EFTDHLTHKLKHHPGQIEAAAIMEHILDGSSY-VKAAEKLHEQDPLQKP
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              LTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEVKVKDDEGIL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 -ETLNAAEAFAQVGISSGFFELQPKEGLALVNGTAVGSGLASTVLFETNILALLSEILSA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            WQTPSSQAPAHAYLSPRTRVLYSFVREELGVQARRGDVFVGVQQETIGSNVSRIYEAIKD
        711
             8
             77363 MW;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       --VEHALTNGENEKNASTSI
                 3120AB2877C29513 CRC64;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            ammonia-lyase
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    711
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Saltveit
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   -FQKITAFEEELKTILPKEVESARA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   databases
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            it M.;
(PAL)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 gene
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     ä
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      543
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            653
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          648
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        600
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      591
```

```
REPART OF STREET
                                                                                                                                                                                                                                                                                                                                    Ş
                                                                                                                                                                                                                                                                                                                                                                        В
                                                                                                                                                                                                                                                                                                                                                                                              8
                                                                                                                                                                                                                                                                                                                                                                                                                           B,
                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             멂
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            D,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Query Match
Best Local Similarity
Matches 267; Conserv
                                                                                             O9AXI5 PRELIMINARY; PRT; 711 AA.

Q9AXI5,
Q9AXI5,
Q9AXI5,
Q9AXI5,
Q9AXI5,
Q9AXI5,
Q9AXI5,
Q9AXI5,
Q9AXI5,
Q9AXI5,
Q9AXI5,
Q9AXI5,
Q1.-Q10.1 (TrEMBLrel. 17, Created)
Q1.-Q10.2001 (TrEMBLrel. 17, Last sequence update)
Q1.-Q10.2003 (TrEMBLrel. 25, Last annotation update)
Phenylalanine ammonia-lyase (EC 4.3.1.5).
Pharbitis nil (Violet) (Japanese morning glory).
Eukaryota; Viridiplantae; Streptophyta; Embryophyta; Tracheophyta;
Spermatophyta; Magnoliophyta; eudicotyledons; core eudicots; aster:
lamids; Solanales; Convolvulaceae; Ipomoea.
                                                                                                                                                                                                                                                                  4.
                                                                                                                                                                                                                                                                                                                                                                                                                                     549
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                491
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           513
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         431
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     454
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 371
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            394
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       334
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 274
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               196
                                                                                                                                                                                                                                                                                                                                             675
                                                                                                                                                                                                                                                                                                                  661
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 83
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       40
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       NRGLPSCLA-AEDPSLNYHGKGLDIHIAAYASELGHLANPVTTFVQPAEMGNQAVNSLAL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                VARNIRTLLSGSSFAVEHBEEVKVKDDEGILRODRYPLRTSPOFLGPLVEDMMHAYSTLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            LVNGTAVSASMATLSLHDSHMLSLLSQALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     SASGDLSPLSYIAGAITGHPDVKVHVLHEGTEKIMFAREAISLFGLEA--VVLGPKEGLG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       FGNGTETSHTLPHSATRAAMIVRINTLLQGYSGIRFEILEAITKFLNNNITPCLPLRGTI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             FSVGRGLENTLPLEVVRGAMVIRVNSLTRGHSAVRLVVLEALTNFLNHRITPIVPLRGSI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           GLDGHAAHQSQLEIVQELLSDFTDDVVELSGYSLTVRDVVG--AARKGRRVRVQNDDEIR
                                                                                                                                                                                                                                                                                                                                                                                                                                     G-ELHPSRFCEKDLLRVVDREY-----VFAYIDDVCSGTYPLMOKLROVLVDHALNNGE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         NNGLPSNLSGGRNPSLDYGFKGGEIAMASYCSELQFLANPVTNHVQSAEQHNQDVNSLGL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     LVNGTAVGSGMASMVLFDANVLALLSEVLSAIFAEVMQGKP-EFTDHLTHKLKHHPGQIE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               TASGDLVPLSYTAGLLTGRPNSKA----VGPTGEVLNAEKAFAAAGVEGGFFELQPKEGLA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 AGVKASSDWVMESMNKGTDSYGVTTGFGATSHRRTKQGGALQKELIRFLNAGI-----
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             ARVDKSVDFLKAQLQNSV--YGVTTGFGGSADTRTEDAVSLQKALIEHQLCGVTPTSXSS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          GVAAEALTGSHLDEVKKMVAEFRKPVVKLGGETLTVSQVAGIAAANDSDTVKVELSEAAR
                                                                                                                                                                                                                                                                                                                                                                           TEXNINTSI-FORIATFEEELKVLLPKEVEGVRIAYENDILSIPNRIKACRSYPLYRFVR
                                                                                                                                                                                                                                                                                                                                                                                                         SANVTLTAVNAWKVASAEKAIS--LTREVRN-RFWQTPSSQAPAHAYLSPRTRVLYSFVR
                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ALALEVKKALNKRLEQTTTYDLEPRWHDAFSY----ATGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           ISARRTAEANDVLSLLLASHLYCTLQAVDLRAMELDFKKQFDPLLFTLLQQHLGTGLDVN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           AAAIMEYILDGSDY-VKAAQKVHEMDPLQKPKQDRYALRTSPQWLGPQIEVIRSSTKMIE
                                                                                                                                                                                                                                                                                                                                            EELGVQARRGDVFVGVQQETIGSNVSRIYEAIKDGRINHVLVKML
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               ISARKTAEAVDILKLMSSTYLVALCOSIDLRHLEENMKSTVKNTVSQVAKKVLTMG--VN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Conservative
                                                                                                                                                                                                                                                                                                                  -RG-FLTGEKVTSPGEEFDRVFTAMCKGQIIDPLLECL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  28.4%; Score 1025; DB 37.9%; Pred. No. 4e-60;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  127;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Mismatches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     259;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                10;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Length
                                                                                                                                                                                                                                                                                                                                               719
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     52;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                    VVELLSSSP
                                                                                                                        asterids;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          195
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    135
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            490
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              370
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          393
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    333
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  252
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              273
                                                                                                                                                                                                                                                                                                                                                                                660
                                                                                                                                                                                                                                                                                                                                                                                                                                        601
                                                                                                                                                                                                                                                                                                                                                                                                                                                                      617
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   548
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              572
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        512
                                                                                                                                                                                                                                                                                                                                                                                                            674
```

SEQUENCE FROM N.A.
STRAIN-cv. Violet;
Nakazawa A., Nozue M., Yasuda
"Expression of phenylalanine
Submitted (DEC-2000) to the E

Yasuda H.,

Yasuda H., Takeba G., I anine ammonia-lyase in the EMBL/GenBank/DDBJ

, Kubo H.; in Pharbitis BJ databases.

NCBI\_TaxID=35883;

```
В
RESULT
Q7X7G3
                                                                                  성 음 성
                                                                                                                                                                                                                                                                                                                                                                                                                                        B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                         중 음 장
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        δõ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              뭕
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Query Match
Best Local Similarity
Matches 270; Conserv
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   EMBL; AF325496; AAG49585.1; -.

HSSP; P21310; 1B8F.

GG; GO:0005737; C:cytoplasm; IEA.

GG; GO:00016211; F:ammonia ligase activity; IEA.

GG; GO:0016221; F:ammonia ligase activity; IEA.

GG; GO:0016829; F:lyase activity; IEA.

GG; GO:00045549; F:phenylalanine ammonia-lyase act

GG; GO:000558; P:biosynthesis; IEA.

GG; GO:0006559; P:phenylalanine catabolism; IEA.

GG; GO:0006559; P:phenylalanine catabolism; IEA.

GG; GO:0006559; P:phenylalanine catabolism; IEA.

GG; GO:0006599; P:phenylalanine catabolism; IEA.

GG; GO:000659; P:phenylalanine ammonia-lyase

GG; GO:000569; P:phenylalanine ammonia-lyase

FIGEPAMS; TIGR01226; phe_am_lyase; 1.

FIGEPAMS; TIGR01226; phe_am_lyase; 1.

FIGEPAMS; TIGR01226; phe_am_lyase; 1.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Lyase.
SEQUENCE
                                                                                          667
                                                                                                                                                                                          535
                                                                                                                                                                                                                                                                                                                       440
                                                                                                                                                                                                                                                                                                                                                        462
                                                                                                                                                                                                                                                                                                                                                                                       380
                                                                                                                                                                                                                                                                                                                                                                                                                    403
                                                                                                                                                                                                                                                                                                                                                                                                                                                    321
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     343
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     262
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  283
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  94
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               34
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              49
                                                                                                                       ELLSSSPSANVTLTAVNAMKVASAE---KAISLTREVR-NRFWQTPSSQAPAHAYLSPRT
                                                                                                                                                                                                                                                                                                                                                                                   RVLYSFVREELGVQARRGDVFVGVQQETIGSNVSRIYEAIKDGRINHVLVKML
                                                                                                                                                                                     VTQVAKRTLTMGANGELHPARFCEKDLLRVVDREYVFAYADDFCSANYPLMQKLRQALVD
                                                                                                                                                                                                                       LNKRLEQTTTYDLEPRWHDA------FSYA-----
                                                                                                                                                                                                                                                      NDVLSLLLASHLYCTLQAVDLRAMELDFKKQFDPLLPTLLQQHLGTGLDVNALALEVKKA
                                                                                                                                                                                                                                                                                                                  DGSSY-VKAAQXMHEMDPLQKFKQDRYALRTSPQWLGPQIEVIRAATKMIEREINSVNDN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                     SGSSFAVEHEEEVKVKDDEGILRQDRYPLRTSPQFLGPLVEDMYHAYSTLSLENNTTTDN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                DSMNKGTDSYGVTTGFGATSHRRTKQGGALQKELIRFLNAGI------FGNGTESCH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 AQLQNSV--YGVTTGFGGSADTRTEDAVSLQKALIEHQLCGVTPTSXSSFSVGRGLE--N
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              711 AA;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        28.2%; Score 1018; DB 10; Length ilarity 37.9%; Pred. No. 1.2e-59; Conservative 114; Mismatches 241; Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                77085 MW; CBE6E3A0C0969E90 CRC64;
                                                             ELLTGEKVRSPGEECDKVFTAMCEGSIIDPLLECL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            IEA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             88
                                                                                                                                                                                                                         ----TGTVV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Gaps
                                                                                                                                                                                                                         610
                                                                                                                                                                                                                                                      534
                                                                                                                                                                                                                                                                                     58
                                                                                                                                                                                                                                                                                                                      499
                                                                                                                                                                                                                                                                                                                                                    521
                                                                                                                                                                                                                                                                                                                                                                                                                  461
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   402
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              320
                                                                                                                                                                                                                                                                                                                                                                                                                                                    379
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 261
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             282
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               204
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              224
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             144
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               164
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            93
                         В
                                                 Ş
                                                                                   B,
                                                                                                                  Ş
                                                                                                                                                      В
                                                                                                                                                                              Ş
                                                                                                                                                                                                                      뮍
                                                                                                                                                                                                                                            γŞ
                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                             δ
                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                           Š
                                                                                                                                                                                                                                                                                                                                                                                                                  B
                                                                                                                                                                                                                                                                                                                                                                                                                                            Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Query Match 28.2%; Score 1016.5; DB 10; Length Best Local Similarity 36.9%; Pred. No. 1.5e-59; Matches 268; Conservative 144; Mismatches 254; Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Q7X7G3;
Q1-QCT-2003 (TrEMBLrel. 25, Created)
Q1-QCT-2003 (TrEMBLrel. 25, Last sequence update)
Q1-QCT-2003 (TrEMBLrel. 25, Last annotation update)
Q5UNBA0073E02.12 protein (Q5UNBB0061C13.1 protein).
Q5UNBA0073E02.12 QR OSUNBB0061C13.1.
Q5UNBA0073E02.12 QR OSUNBB0061C13.1.
Oryza sativa (Rice).
Q5UNBA0073E02.12 QR OSUNBB0061C13.1.
Q72a sativa (Rice).
Q6UNGATORIA (Rice).
Q72a sativa (Rice).
Q72a sativa (Rice).
Q8UNBAUTORIA (Rice).
Q8UNBAUTORIA (Rice).
Q8UNBAUTORIA (Rice).
Q8UNBAUTORIA (Rice).
Q8UNBAUTORIA (Rice).
Q8UNBAUTORIA (Rice).
Q8UNBAUTORIA (Rice).
Q8UNBAUTORIA (Rice).
Q8UNBAUTORIA (Rice).
Q8UNBAUTORIA (Rice).
Q8UNBAUTORIA (Rice).
Q8UNBAUTORIA (Rice).
Q8UNBAUTORIA (Rice).
Q8UNBAUTORIA (Rice).
Q8UNBAUTORIA (Rice).
Q8UNBAUTORIA (Rice).
Q8UNBAUTORIA (Rice).
Q8UNBAUTORIA (Rice).
Q8UNBAUTORIA (Rice).
Q8UNBAUTORIA (Rice).
Q8UNBAUTORIA (Rice).
Q8UNBAUTORIA (Rice).
Q8UNBAUTORIA (Rice).
Q8UNBAUTORIA (Rice).
Q8UNBAUTORIA (Rice).
Q8UNBAUTORIA (Rice).
Q8UNBAUTORIA (Rice).
Q8UNBAUTORIA (Rice).
Q8UNBAUTORIA (Rice).
Q8UNBAUTORIA (Rice).
Q8UNBAUTORIA (Rice).
Q8UNBAUTORIA (Rice).
Q8UNBAUTORIA (Rice).
Q8UNBAUTORIA (Rice).
Q8UNBAUTORIA (Rice).
Q8UNBAUTORIA (Rice).
Q8UNBAUTORIA (Rice).
Q8UNBAUTORIA (Rice).
Q8UNBAUTORIA (Rice).
Q8UNBAUTORIA (Rice).
Q8UNBAUTORIA (Rice).
Q8UNBAUTORIA (Rice).
Q8UNBAUTORIA (Rice).
Q8UNBAUTORIA (Rice).
Q8UNBAUTORIA (Rice).
Q8UNBAUTORIA (Rice).
Q8UNBAUTORIA (Rice).
Q8UNBAUTORIA (Rice).
Q8UNBAUTORIA (Rice).
Q8UNBAUTORIA (Rice).
Q8UNBAUTORIA (Rice).
Q8UNBAUTORIA (Rice).
Q8UNBAUTORIA (Rice).
Q8UNBAUTORIA (Rice).
Q8UNBAUTORIA (Rice).
Q8UNBAUTORIA (Rice).
Q8UNBAUTORIA (Rice).
Q8UNBAUTORIA (Rice).
Q8UNBAUTORIA (Rice).
Q8UNBAUTORIA (Rice).
Q8UNBAUTORIA (Rice).
Q8UNBAUTORIA (Rice).
Q8UNBAUTORIA (Rice).
Q8UNBAUTORIA (Rice).
Q8UNBAUTORIA (Rice).
Q8UNBAUTORIA (Rice).
Q8UNBAUTORIA (Rice).
Q8UNBAUTORIA (Rice).
Q8UNBAUTORIA (Rice).
Q8UNBAUTORIA (Rice).
Q8UNBAUTORIA (Rice).
Q8UNBAUTORIA (Rice).
Q8UNBAUTORIA (Rice).
Q8UNBAUTORIA (Rice).
Q8UNBAUTORIA (Rice).
Q8UNBAUTORIA (Rice).
Q8UNBAUTORIA (Rice).
Q8UNBAUTORIA (Rice
                             525
                                                          551
                                                                                         465
                                                                                                                      491
                                                                                                                                                        405
                                                                                                                                                                                       432
                                                                                                                                                                                                                       345
                                                                                                                                                                                                                                                    372
                                                                                                                                                                                                                                                                                     287
                                                                                                                                                                                                                                                                                                                    312
                                                                                                                                                                                                                                                                                                                                                    227
                                                                                                                                                                                                                                                                                                                                                                                   254
                                                                                                                                                                                                                                                                                                                                                                                                                  170
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 119
                                                                                                                                                                                                                                                                                                                                                                                                                                                   194
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 59
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                79
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             22
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              N
                                                                                       NPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQAVDLRAMELDFK
                                                                                                                                                                       LALALIGKLNFTQCTELLNAAMNRGLPSCLA-AEDPSLNYHGKGLDIHIAAYASELGHLA
                                                                                                                                                                                                                    RTSPQFLGPLVEDMMHAYSTLSLENNTTTDNPLLDVENKQTAHGGNFQASAVSISMEKTR
                                                                                                                                                                                                                                                                                                                                                                                                                SLQKALIEHQLCGVTPTSXSSFSVGRGLE-NTLPLEVVRGAMVIRVNSLTRGHSAVRLVV
                                                                                                                                                                                                                                                                                                      GQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEVKVKDDEGILRQDRYPL
                                                                                                                                                                                                                                                                                                                                                   --VGAARKGRRVRVQNDDEIRARVDKSVDF1KAQLQN--SVYGVTTGFGGSADTRTEDAV
                             SAVKNCVTTVAKKVLTTG---PAGGLHSARFSEKAL--LTAIDREA----VYSYADDPCS
                                                        --- KQFDPLLPTLLQQHLGTGLDVNALALEVKKALNKRLEQTTTYDLEPRWHDAFSYATG
                                                                                                                                                     LAIANIGKLMFAQFSELVNEFYNNGLTSNLAGSRNPSLDYGFKGTEIAMASYCSELQFLA
                                                                                                                                                                                                                                                                                     GKP-EYTDHLTHKLKHHPGSIEAAAIMEHILAGSAF-MPHAQKVNEVDPLLKPKQDRYAL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 AAPTKSAAGETSALRRTEGLDGHAAHQ---SQLEIVQELLSDETDDVVELSGYSLTVRDV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            61;
```

78 20

ó

803

-----TVVELLSSSPSANVTLTAVNAWKVASAEKAI--SLTREVRNRFWQTPS

524

464 490 431

344

404

371 286

```
RESULT 6

CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF C
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   RY SEQUENCE FROM N.A.

RA Nguyen M., Karlin-Neumann G., Southwick A., Tripp M., Miranda M.,

RA Palm C.J., Bowser L., Jones T., Banh J., Carninci P., Chen H.,

RA Cheuk R., Chung M.K., Hayashizaki Y., Ishida J., Kamaiya A., Kawai J.,

RA Cheuk R., Chung M.K., Narusaka M., Pham P.K., Sakano H.,

RA Sakurai T., Satou M., Seki M., Shinn P., Yamada K., Shinozaki K.,

RA Sakurai T., Theologis A., Davis R.W.;

Submitted (SEP-2002) to the EMBL/GenBank/DDBJ databases.

DR EMBL; AY092957; AAM12566.1; -.

DR EMBL; BT000035; AAN15354.1; -.

DR GO; GO:0016211; F:ammonia ligase activity; IEA.

GO; GO:0016211; F:ammonia-lyase activity; IEA.

GO; GO:001623; F:jase activity; IEA.

GO; GO:001629; F:lyase activity; IEA.

GO; GO:0006529; P:biosynthesis; IEA.

GO; GO:0006529; P:phenylalanine catabolism; IEA.

DR GO; GO:00058; D-bosynthesis; IEA.

DR InterPro; IPR0010106; Phe/His NH3lyase.

DR InterPro; IPR001106; Phe/His NH3lyase.

DR TIGRFAMS; TIGR01226; phe am lyase; 1.

DR TIGRFAMS; TIGR01226; phe am lyase; 1.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       S
                                                                    Ď,
                                                                                                                                 Ś
                                                                                                                                                                                                         g
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        В
   Q
                                                                                                                                                                                                                                                                      Š
                                                                                                                                                                                                                                                                                                                                          Query Match
Best Local S
Matches 264
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Southwick A. Karlin-Neumann G., Nguyen M., Lam B., Miranda M., Palm C.J., Bowser L., Jones T., Banh J., Carninci P., Chen H., Cheuk R., Chung M.K., Hayashizaki Y., Ishida J., Kamiya A., Kawai Kim C., Lin J., Liu S.X., Narusaka M., Pham P.K., Sakano H., Sakurai T., Satou M., Seki M., Shinn P., Yamada K., Shinozaki K., Ecker J., Theologis A., Davis R. W., Summitted (MAR-2002) to the EMBL/GenBank/DDBJ databases.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       01-JUN-2002 (TrEMBLrel. 21, Created)
01-JUN-2002 (TrEMBLrel. 21, Last sequence update)
01-OCT-2003 (TrEMBLrel. 25, Last annotation update)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Eukaryota; Viridiplantae; Streptophyta; Embryophyta; Tracheophyta; Spermatophyta; Magnoliophyta; eudicotyledons; core eudicots; rosids; eurosids II; Brassicales; Brassicaceae; Arabidopsis.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    SEQUENCE FROM N.A.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 NCBI_TaxID=3702;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Arabidopsis thaliana (Mouse-ear cress).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Phenylalanine ammonia-lyase.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Q8RWP4;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Q8RWP4
   123
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            713
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               576
                                                                       9
                                                                                                                                 9
                                                                                                                                                                                                                                                                                                                                                                           Similarity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        DPMLECL 696
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         HVLVKML 719
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          GTAPITNRIKESRSFPLYRFVREELGCV-----YLTGEKLKSPGEECNKVFLAISERKLI 689
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          SQAP-AHAYLSPRTRVLYSFVREELGVQARRGDVFVGVQQETIGSNVSRIYEAIKDGRIN
GGSADTRTEDAVSLQKALIEHQLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIRVNSL
                                                                       VVNLGGETLTIGQVAAISTVGGSVKVELAETSRAGVKASSDWVMESMNKGTDSYGVTTGF
                                                                                                                                 VVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSV--YGVTTGF
                                                                                                                                                                                                            MDQ1EAMLCGGGEKTKVAVTTKTLADPLNW-----GLAADQMKGSHLDEVKKMVAEYRRP
                                                                                                                                                                                                                                                                         LDSLATTLANGETNGSHAAPTKSAAGPTSALRRTPGLDGHAAHQSQLEIVQELLSDPTDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ANYPLMTKIRAVLVEHALANGPAEKDDGSSVFS-KITAFEEELREALPREMEAARVAFET
                                                                                                                                                                                                                                                                                                                                                                                                                                                                               717 AA;
                                                                                                                                                                                                                                                                                                                                              Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      PRELIMINARY;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                            77801 MW; C4C9CBDCDB91A838 CRC64;
                                                                                                                                                                                                                                                                                                                                          28.2%; Score 1016.5; DB 10; Length 717; 36.0%; Pred. No. 1.5e-59; tive 141; Mismatches 283; Indels 45;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      717
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      8
                                                                                                                                                                                                                                                                                                                                              Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  ;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        ٦.
                                                                                                                                                                                                            <u>წ</u>
                                                                                                                                                                                                                                                                         64
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              712
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           634
```

```
Š
                                                    8
                                                                              Ş
                                                                                                                                    Ş
                                                                                                                                                                  밁
                                                                                                                                                                                               Š
                                                                                                                                                                                                                                                   Ş
                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                           Ş
                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                    Ş
                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                         Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      B
밁
                                                                                                             밁
                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                        479
                                                                                                                                                                                                                                                                                                                                                                       360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  169
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        116
                                                                                                               580
                                                                                                                                                                                                                             463
                                                                                                                                                                                                                                                                                    403
                                                                                                                                                                                                                                                                                                                 420
                                                                                                                                                                                                                                                                                                                                           343
                                                                                                                                                                                                                                                                                                                                                                                                    285
                                                                                                                                                                                                                                                                                                                                                                                                                               300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     243
                           707
                                                                                                                                          593
                                                                                                                                                                     523
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  LQGYSGIRFEILEAITSLLNHNISPSLPLRGTITASGDLVPLSYIAGLLTGRPNSKA---
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   KDGRINHVLVKML 719
                                                                                                                                        DLEP--RWHDAFSYATGTVVE-LLSSSPSANVTLTAVNAWKVASAEKAIS--LTREVRNR
                                                                                                                                                                                               AVDERAMELDFKKQFDFLLFTLLQQHLGTGLDVNALALEVKKALNKRL-----
                                                                                                                                                                                                                           MASYCSELQYLANPVTSHVQSAEQHNQDVNSLGLISSRKTSEAVDILKLMSTTFLVGICQ
                                                                                                                                                                                                                                                                                   GTPIGVŚMDNTRLAIAAIGKLMFAQFSELVNDFYNNGLPSNLTASSNPSLDYGFKGAEIA
                                                                                                                                                                                                                                                                                                     PLOKPKODRYALRTSPOWLGPOIEVIROATKSIEREINSVNDNPLIDVSRNKAIHGGNFO
                                                                                                                                                                                                                                                                                                                                                                       DEGILRODRYPLRTSPOFLGPLVEDMMHAYSTLSLENNTTTDNPLLDVENKQTAHGGNFQ
                                                                                                                                                                                                                                                                                                                                                                                                    EVISAIFAEVMSGKP-EFTDHLTHRLKHHPGQIEAAAIMEHILDGSSY-MKLAQKVHEMD
                                                                                                                                                                                                                                                                                                                                                                                                                             QALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEVKVKD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    HEGTE-KIMFAREAISLEGLEA--VVLGPKEGLGLVNGTAVSASMATLSLHDSHMLSLLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 TRGHSAVRLVVLEALTNFLNHRITFIVPLRGSISASGDLSPLSYIAGAITGHPDVKVHVL
                                                       RAAYGNGTAPIPNRIKECRSYPLYRFVREELGTKLLTGEKVV----SPGEEFDKVFTAM
                                                                                                               VDDPCSATYPLMQRLRQVIVDHALSNGETEKNAVTSI-FQKIGAFEEELKAVLPKEVEAA
                                                                                                                                                                     AVDIRHLEENIRQTVKNTVSQVAKKVITTGINGE---LHPSRFCEKDIIKVVDREQVFTY
                                                                                                                                                                                                                                                      IAAYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                         -TGPDGESLTAKEAFEKAGISTGFFDLQPKEGLALVNGTAVGSGMASMVLFEANVQAVLA
CEGKLIDPLMDCL 706
                                                                                 FWQTPSSQAPAHAYLSP-RTRVLYSFVREELGVQARRGDVFVGVQQETIGSNVSRIYEAI
                                                                                                                                                                                                  -EQTTTY
                                                                                                                                                                                                  592
                                                                                                                                            647
                                                                                                                                                                                                                                                                                      462
                                                                                                                638
                                                                                                                                                                       579
                                                                                                                                                                                                                                                        538
                                                                                                                                                                                                                                                                                                                 478
                                                                                                                                                                                                                                                                                                                                              402
                                                                                                                                                                                                                                                                                                                                                                         419
                                                                                                                                                                                                                                                                                                                                                                                                    342
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         168
                                                         693
                                                                                     706
                                                                                                                                                                                                                              522
                                                                                                                                                                                                                                                                                                                                                                                                                               359
                                                                                                                                                                                                                                                                                                                                                                                                                                                            284
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     299
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  225
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              242
```

RESULT 7
Q94ENO
ID Q94E
AC Q94E
AC Q94E
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-(
DT 01-Q94EN0 PRELIMINARY; Q94EN0; TYPEMBLED: 19, 01-DEC-2001 (TYPEMBLED: 19, 01-DEC-2003 (TYPEMBLED: 25, Rhemannia glutinosa.";
Submitted (JUL-2001) to the EMBL/GenBank/DDBJ databases.
EMBL; AF401636; AAK84225.1;
GO; GO:0005737; C:cytoplasm; IEA.
GO; GO:0016211; F:ammonia ligase activity; IEA.
GO; GO:001629; F:lyase activity; IEA.
GO; GO:00165548; F:phenylalanine ammonia-lyase activity;
GO; GO:0005589; P:biosynthesis; IEA.
GO; GO:000559; P:phenylalanine catabolism; IEA. STRAIN-cv. Keumsan; Yun S.J., Lee B.K., Park M.R., "Molecular characterization of NCBI\_TaxID=99300; Eukaryota; Viridiplantae; Streptophyta; Embryophyta; Tracheophyta; Spermatophyta; Magnoliophyta; eudicotyledons; core eudicots; aster lamiids; Lamiales; Lamiales incertae sedis; Rehmannia. Rehmannia glutinosa. Phenylalanine SEQUENCE FROM N.A. IPR008948; L-Aspartase-like ammonia-lyase Last sequence update)
Last annotation update)
(EC 4.3.1.5). Created) PRT; Srinivas B., (phenylalanine 708 A Chun ammonia-lyase J.-C. IEA gene asterids;

DR DR DR DR DR DR DR DR DR SQ

8

. 13

ς<sub>D</sub>η

<del>ኒ</del>դ

```
RESULT
Q852S1
ID Q8
AC Q8
DT 01
DT 01
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Query Match
Best Local Similarity
Matches 264; Conserv
  Q852S1
Q852S1;
01-JUN-2003
01-JUN-2003
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               InterPro; IPR001106; Phe/His NH3lyase.
InterPro; IPR005922; Phe am_lyase.
InterPro; IPR005162; Ppanine_S.
InterPro; IPR006162; Ppanine_S.
ITIGR07221; PAL; 1.
ITIGR07245; TIGR01226; phe am_lyase; 1.
PROSITE; PS00488; PAL HISTIDASE; 1.
PROSITE; PS00488; PAL HISTIDASE; 1.
PROSITE; PS00012; PHOSPHOPANTETHEINE;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   SEQUENCE
                                                                                                                                       œ
                                                                                                                                                                                                                            676
                                                                                                                                                                                                                                                                                                                                      621
                                                                                                                                                                                                                                                                                                                                                                                                                                                   561
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     602
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            522
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 551
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            466
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              491
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      406
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           432
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                346
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     372
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             288
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               312
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       228
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              253
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      171
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        193
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                118
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     133
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             58
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  75
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       w
                                                                                                                                                                                                                         ECDKVFTALSKGLIVDPLLKCL
                                                                                                                                                                                                                                                                              NVSRIYEAIKDGRINHVLVKML
                                                                                                                                                                                                                                                                                                                                      ILPKEVESARIALESGNPAIGNRITECRSYPLYKFIREELGTNYLTGEKVV----
                                                                                                                                                                                                                                                                                                                                                                      SITREVRN-RFWQTPSSQAPAHAYLSPRTRVLYSFVREELGVQARRGDVFVGVQQETIGS
                                                                                                                                                                                                                                                                                                                                                                                                                                             VVDREYVFAYIDDPCSGTYPLMQKLRQVLVDHALNNGESEKNVSTSIFQKIEAFEVELKA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              KQFDPLLPTLLQQHLGTGLDVNALALEVKKALNKRLEQTTTYDLEPRWHDA-----
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      NPVTNHVQSAEQHNQDVNSLGLISSRKTVEALDILKLMSSTYLIALCQAVDLRHLE----
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             NPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLILLASHLYCTLQAVDLRAMELDFK
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   LAIAAIGKLMFAQFSELVNDFYNNGLPSNLSGGRNPSLDYGFKGSEIAMASYCSELQFLA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   LALALIGKLNFTQCTELLNAAMNRGLPSCLA-AEDPSLNYHGKGLDIHIAAYASELGHLA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             RTSPOWLGPQIEVIRTATKWIEREINSVNDTPLIDVSRNKALHGGNFOGTPIGVSMDNTR
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         RTSPQFLGPLVEDMMHAYSTLSLENNTTTDNPLLDVENKQTAHGGNFQASAVSISMEKTR
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          GKP-EFTDHLTHKLKHHPGQIEAAAIMEHILDGSAY-VKAAQKLHETDPLQKPKQDRYAL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               GQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEVKVKDDEGILRQDRYPL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       GEAFSLAGVSGFFELQPKEGLALVNGTAVGSGLASIALYDANILAVLSEVTSVIFAEVM
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           REALSTEGLEAVA-TGEKEGLGLANGTAVSASMATTSTHDSHWTSTTSGATTATIATATA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                GALQKELIRFLNAGI-----FGNGTESNHALPHSATRAAMLVRINTLLQGYSGIRFE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     AVSLOKALIEHOLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIRVNSLTRGHSAVRLV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     ----FSY----ATGT-----VVELLSSSPS-ANVTLTAVNAWKVASAEKAI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             IAQVAAIAARDNAVAVELAETARAGVKASSDWVMESMNKGTDSYGVTTGFGATSHRRTKQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         VRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSV--YGVTTGFGGSADTRTED
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       NGHHHSNGLCVETTRDPLNWVAAAESLKG----SHLDEVKRMVEEFRKPAVKLGGESLT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            NGSHAAP---TKSAAGPTSALRRTPGLDGHAAHQSQLEIVQELLSDPTDDVVELSGYSLT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                708 AA;
     (TrEMBLrel.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Conservative
                                                                                     PRELIMINARY;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            --------ENLRLSVKNTVSQVAKRTLTMGINGELHPSRFCEKDLLR
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                76835 MW; 1B6AF08816F1B8FE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              28.1%;
     24,
24,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 122;
     Last
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Score 1014.5; I
Pred. No. 2e-59;
                                                                                                                                                                                                                                                                                 719
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Mismatches
     sequence
                                                                                     715
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     ۲
                                                                                     A
     update
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    269; Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        DB 10;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CRC64;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 87;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 550
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               431
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        192
                                                                                                                                                                                                                                                                                                                                         675
                                                                                                                                                                                                                                                                                                                                                                                           697
                                                                                                                                                                                                                                                                                                                                                                                                                                                620
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     638
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              601
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         521
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      465
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           490
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                405
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             345
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               371
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    287
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           311
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   227
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        252
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                170
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       57
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               74
                          δ
                                                                               밁
                                                                                                                           . 2
                                                                                                                                                                                               В
                                                                                                                                                                                                                                        Ś
                                                                                                                                                                                                                                                                                                      B
                                                                                                                                                                                                                                                                                                                                                  Š
                                                                                                                                                                                                                                                                                                                                                                                                               DЬ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               D,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            SOUR REAL PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROP
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Query Match
Best Local S
Matches 265
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  pathway.",

Submitted (AUG-2002) to the EMBL/GenBank/DDBJ databases.

BMBL; AB069813; BAC56977.1; -.

R EMBL; AB069813; BAC56977.1; -.

R GO; GO:0005737; C:cytoplasm; IEA.

R GO; GO:0016211; F:ammonia ligase activity; IEA.

R GO; GO:0016829; F:lyase activity; IEA.

R GO; GO:0016829; F:lyase activity; IEA.

R GO; GO:0005548; F:phenylalanine ammonia-lyase activity; IEA.

R GO; GO:0009058; P:biosynthesis; IEA.

R GO; GO:0006559; P:phenylalanine catabolism; IEA.

R GO; GO:0006559; P:phenylalanine catabolism; IEA.

R GO; GO:0006559; P:phenylalanine catabolism; IEA.

R GO; GO:0006559; P:phenylalanine catabolism; IEA.

R GO; GO:0006559; P:phenylalanine catabolism; IEA.

R GO; GO:0006559; P:phenylalanine catabolism; IEA.

R GO; GO:0006559; P:phenylalanine catabolism; IEA.

R GO; GO:0006559; P:phenylalanine catabolism; IEA.

R GO; GO:0006559; P:phenylalanine catabolism; IEA.

R GO; GO:000559; P:phenylalanine catabolism;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  STRAIN-cv. Kurodagosun;
Ozeki Y., Chikagawa Y., Kimura S., Soh H., Maeda K., Pornsiriwong
Ozeki Y., Chikagawa Y., Kimura S., Soh H., Maeda K., Itoh Y.,
Kato M., Akimoto H., Oyanagi M., Fukuda T., Koda T., Itoh Y.,
Yamada A., Ueno H., Takeda J.;
"Putative cis-elements in the promoter region of phenylalanine
"Putative cis-elements in the promoter region of phenylalanine
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Lyase.
SEQUENCE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Daucus.
NCBI_TaxID=4039;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Eukaryota; Viridiplantae; Streptophyta; Embryophyta; Tracheophyta; Spermatophyta; Magnoliophyta; eudicotyledons; core eudicots; aster campanulids; Apiales; Apiaceae; Apioideae; Scandiceae; Daucinae;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        SEQUENCE FROM N.A.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Daucus carota (Carrot)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Phenylalanine GDCPAL3.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    01-OCT-2003 (TrEMBLrel. 25, Phenylalanine ammonia-lyase
                                                                                     405
                                                                                                                                       424
                                                                                                                                                                                               345
                                                                                                                                                                                                                                                    364
                                                                                                                                                                                                                                                                                                        287
                                                                                                                                                                                                                                                                                                                                                             304
                                                                                                                                                                                                                                                                                                                                                                                                                     227
                                                                                                                                                                                                                                                                                                                                                                                                                                                                          246
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  170
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            119
                                483
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       186
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         59
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  265;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 72
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     16 FTNGSHAAPTKSAAGPTSALRRTP----GLDGHAAHQSQLEIVQELLSDPTDDVVELSGY
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     ω
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Similarity
ASELGHLANPUTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQAVDL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        YTNGHH-----ENGNGVDLCMKKEDPLSWGVAAEALKGSHLEEVKRMVAEYRKPVVKLGGE
                                                                                     GVSMDNTRLAIAAIGKLMFAQFSELVNDFYNNGLPSNLSGGRNPSLDYGFKCAEIAMASY
                                                                                                                                 SISMEKTRLALIGKLNFTQCTELLNAAMNRGLPSCLA-AEDPSLNYHGKGLDIHIAAY
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 HSAVRLVVLEALTNFLNHRITPIVPLRGSISASGDLSPLSYIAGAITGHPDVKVHVLHEG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           SLTVRDVVG-AARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSV--YGVTTGFGGSADT
                                                                                                                                                                                               PKQDRYALRTSPQWLGPQIEVIRSSTKMIEREINSVNDNPLIDVSRNKAIHGGNFQGTPI
                                                                                                                                                                                                                                                    LRODRYPLRTSPOFLGPLVEDMMHAYSTLSLENNTTTDNPLLDVENKOTAHGGNFOASAV
                                                                                                                                                                                                                                                                                                           AIFAÉVMQGKP-EFTDHLTHKLKHHPGQIEAAAIMEHILDGSAY-VKAAQKLHEMDPLQK
                                                                                                                                                                                                                                                                                                                                                             ALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEVKVKDDEGI
                                                                                                                                                                                                                                                                                                                                                                                                                     TGVTLSPEEAFKLAGVEGGFFELQPKEGLALVNGTAVGSGMASMVLFEANI LAVLAEVMS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                          TEKIMFAREAISLFGLEA--VVLGPKEGLGLVNGTAVSASMATLSLHDSHMLSLLSQALT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               YSGIRFEILEAITKFLNHNITPCLPLRGTITASGDLVPLSYIAGLLTGRPNSKA---VGP
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               RTKQGGALQKELIRFLNAGI-----FGSGAEAGNNTLPHSATRAAMLVRINTLLQG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 RTEDAVSLOKALIEHOLCGVTFTSXSSFSVGRGLE---NTLFLEVVRGAMVIRVNSLTRG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         TLTISQVAAISARDDSGVKVELSEAARAGVKASSDWVMESMNKGTDSYGVTTGFGATSHR
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         715
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         AA;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         77802 MW;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       28.1%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               131;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Score 1013; D
Pred. No. 2.6e
31; Mismatches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Last annotation update) (EC 4.3.1.5).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            8D067795D57565B4 CRC64;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             2.6e-59;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    DB 10;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  275;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       715;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               64;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   asterids;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Σ.
                                                                                                                                                                                                                                                                                                                                                                   363
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               169
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       185
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            118
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 128
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        58
                                                                                     464
                                                                                                                                             482
                                                                                                                                                                                               404
                                                                                                                                                                                                                                                      423
                                                                                                                                                                                                                                                                                                                                                                                                                     286
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     226
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       245
```

Ş

유양

Ş В Ś 유영

Š 밁 8 멍 Ş Ş Ъ Ş 밁 8 B 8 В

밁

```
RESULT
Q8H6V6
                                                                                                                                                                                                                                                                             Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 멍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                δÃ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ś
                             Ś
                                                                밁
                                                                                                 Ş
                                                                                                                                      밁
                                                                                                                                                                   Ş
                                                                                                                                                                                                                                                                                                     EMBL; AF48061; AANS2279.1; -...

GO; GO:0005737; C:cytoplasm; IEA.

GO; GO:0016211; F:ammonia ligase activity; IEA.

GO; GO:0016841; F:ammonia-lyase activity; IEA.

GO; GO:0016829; F:lyase activity; IEA.

GO; GO:00016829; F:biosynthesis; IEA.

GO; GO:0009058; P:biosynthesis; IEA.

GO; GO:0006559; P:phenylalanine catabolism; IEA.

InterPro; IPR008948; L-Aspartase-like.

InterPro; IPR001106; Phe/His_NH31yase.

InterPro; IPR005122; Phe_am_lyase.

PEam; PP00221; PAL; I.

ITIGRPAMS; TIGR01226; Phe_am_lyase; 1.

PROSITE; PS00488; PAL_HISTIDASB; 1.
                                                                                                                                                                                                           Matches
                                                                                                                                                                                                                                           Query Match
                                                                                                                                                                                                                                                                             Lyase.
SEQUENCE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      MEDLINE=22264006; PubMed=12376645; Kao Y.Y., Harding S.A., Tsai C.J.; "Differential expression of two distinct phenylalanine ammonia-lyase genes in condensed tannin-accumulating and lignifying cells of quaking aspen."; aspen.";
                                                                                                                                                                                                                                                                                                   TIGREAMS; TIGRU122
PROSITE; PS00488;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Populus tremuloides (Quaking aspen).

Bukaryota; Viridiplantae; Streptophyta; Embryophyta; Tracheophyta;
Spermatophyta; Maguoliophyta; edicotyledons; core eudicots; rosids;
eurosids I; Malpighiales; Salicaceae; Saliceae; Populus.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    01.MAR-2003 (TrEMBLrel. 23, Created)
01.MAR-2003 (TrEMBLrel. 23, Last sequence update)
01.CCT-2003 (TrEMBLrel. 25, Last annotation update)
Phenylalanine ammonia-lyase.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Plant Physiol. 130:796-807(2002).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                SEQUENCE FROM N.A.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               NCBI_TaxID=3693
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Q8H6V6;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            949H8Ğ
                                                                                                                                                                                             Local 265;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           ø
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 690
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   635
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           465
                                  122
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                705
                                                                  52
                                                                                                    65
                                                                                                                                                                        8
                                                                                                                                                                                                                          Similarity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              N-RFWQTPSSQAPAHAYLSPRTRVLYSFVREELGVQARRGDVFVGVQQETIGSNVSRIYE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 AMTKGEIIDPLLECL 704
                                                                                                                                                                        LATTLANGFINGSHAAPTKSAAGPTSALRRTP----GLDGHAAHQSQLEIVQELLSDPTDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                AIKDGRINHVLVKML
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 SARAAVESGNPAIPNRIKECRSYPLYKFVREELGT----EYLTGEKVTSPGEEFDKVFT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      -TTTYDLEPRWHDAFSYATGTVVELLSSSPSANVTLTAVNAWKVASAEKAIS--LTREVR
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         RHLEENLKSTVKNTVSQVAKRVLTMG--VNG-ELHPSRFCEKDLLRVVDREYIFAYIDDP
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          RAMELDFKKQFDFLLPTLLQQHLGTGLDVNALALEVKKALNKRLEQ-----
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CSELQFLANPVTNHVQSAEQHNQDVNSLGLISSRKTSEAVEILKLMSTTFLVGLCQAIDL
FGATSHRRTKQGGALQKELIRFLNAGI-----
                               FGGSADTRTEDAVSLOKALIEHQLCGVTPTSXSSFSVGRGLE--NTLPLEVVRGAMVIRV 179
                                                                  VVNLAGQNLTIAQVASIAGHDASNVKVELSESARPRVKASSDWVMDSMDKGTDSYGVTTG
                                                                                                   VVELSGYSLTVRDVVG-AARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSV--YGVTTG
                                                                                                                                       METITKNGYQNGS------SESLCTQRDPLSWGVAAEAMKGSHLDEVKRMVAEYRKP
                                                                                                                                                                                                                                                                             714 AA;
                                                                                                                                                                                                           Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            PRELIMINARY;
                                                                                                                                                                                                                                                                             77556 MW; 9BDAADA21CECC35D CRC64;
                                                                                                                                                                                                        28.0%; Score 1010.5; DB 10; Length 35.5%; Pred. No. 3.8e-59; tive 135; Mismatches 269; Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     ----TLVEHALNNGDKERNLSTSIFQKIAAFEDELKALLPKEVE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            714
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            A
 --FGNGTETCHTLPHSATRAAMLVRI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      update)
                                                                                                                                                                                                           77;
                                                                                                                                                                                                           Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             524
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       634
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            588
                                                                     111
                                                                                                                                         51
                                                                                                                                                                          64
```

```
RESULT 10
Q7X6M8
                                                SOURCE SEA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            占
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Š
Query Match
Best Local (
                                         Han B., Feng Q., Huang Y.C., Li Y., Zhu J.J., Zhao Q., Hu X.,
Liu Y.L., Mu J., Yu Z., Chen L., Fan D.L., Weng Q.J., Zhang L.,
Lu Y.Q., Yu S.L., Liu X.H., Lu T.T., Zhang Y.J., Lu Y., Li C., Li T.,
Zhang Y., Hu H., Jia P.X., Qian Y.M., Ying K., Zhou B., Chen Z.H.,
Hao P., Zhang L., Wu M., Zhang R.Q., Guan J.P., Fu G., Wang S.Y.,
Hao P., Zhang L., Wu M., Zhang R.Q., Guan J.P., Fu G., Wang S.Y.,
Hao P., Zhang L., Wu M., Gu W.Q., Zhu G.F., Tu Y.F., Jia J., Yin H.F.,
Zhang Y., Cai Z., Chen J., Kang H., Chen X.Y., Shao C.Y., Sun Y.,
Hu Q.P., Zhang X.L., Zhang W., Wang L.J., Ding C.W., Sheng H.H.,
Gu J.L., Chen S.T., Ni L., Zhu F.H., Hong G.F.,
Submitted (MAY-2002) to the EMBL/GenBank/DDBJ databases.
EMBL, AL731616; CAE054561; -
EMBL, AL731629; CAE05623.1; -
EMBL, AL731629; CAE05623.1; -
                                                                                                                                                                                                                                                                                                                                                 Q7X6M8;
                                                                                                                                                                                                                                                        SEQUENCE
                                                                                                                                                                                                                                                                                 NCBI_TaxID=4530;
                                                                                                                                                                                                                                                                                                    Spermatophyta; Magnoliophyta;
Ehrhartoideae; Oryzeae; Oryza.
                                                                                                                                                                                                                                                                                                                   Eukaryota; Viridiplantae; Streptophyta; Embryophyta;
Spermatophyta; Magnoliophyta; Liliopsida; Poales; Poa
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          694
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      637
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        569
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    592
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  532
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 453
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              393
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            413
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           338
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        353
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        279
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      297
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                163 NTLLQGYSGIRFEILEAITKLLNNNITPCLPLRGTITASGDLVPLSYIAGLLTGSENSKA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              180
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GKGLDIHIAAYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLAS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              LHGGNFQGTPIGVSMDNVRLAIASIGKLLFAQFSELVNDFYNNGLPSNLTASRNPSLDYG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        AHGGNFQASAVSISMEKTRLALALIGKLNFTQCTELLNAAMNRGLPSCL-AAEDPSLNYH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      LLSQALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVE----HE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                HVLHEGTE-KIMFAREAISLFGLEA--VVLGPKEGLGLVNGTAVSASMATLSLHDSHMLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      NSLTRGHSAVRLVVLEALINFLNHRITPIVPLRGSISASGDLSPLSYIAGAITGHPDVKV
                                                                                                                                                                                                                                                       FROM N.A
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            SPGEEFDKVFTAMCEGKIIDPMLECL 703
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       TIGSNVSRIYEAIKDGRINHVLVKML 719
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    AIS--LTREVRN-RFWQTPSSQAPAHAYLSPRTRVLYSFVREELGVQARRGDVFVGVQQE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      YDLEPRWHDAFSYATG------TVVELLSSSPSANVTLTAVNAWKVASAEK
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                HLYCTLQAVDLRAMELDFKKQFDFLLFTLLQQHLGTGLDVNALALEVKKALNKRLEQTTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                FKGAEIAMASYCSELQYLANPVTSHVQSAEQHNQDVNSLGLISSRKTAEAVDILKLMSTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          MDPLQKP-----KQDRYALRTSPQWLGPQIEVIRFSTKSIEREINSVNDNPLIDVSRNKA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      EEVKVKDDEGILRODRYPLRTSPQFLGPLVEDMMHAYSTLSLENNTTTDNPLLDVENKQT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      VLSELISAIFAEVMNGKP-EFTDHLTHKLKHHPGQIBAAAIMEHILDGSAYMKAAKKLHE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    ----TGPNGEVLDAVEAFKAAGIDSGFFELQPKEGLALVNGTAVGSGLASMVLFETNVLA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        ELKALLPKEVESARAAYDSGNSAIENKIKECRSYPLYKFVREELGT-----GLLTGENVR
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  FLVALCQAIDLRHLEENLRSAVKNTVSHVSKRVLTTGANGE---LHPSRFCEKELLKVV-
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      -DRE----DVFAYADDPCSATYPLMQKLRQVLVDHALANGENEKNASTSV-FQKIAAFED
                                                                                                                                                                                                                                                                                                                                                                                                                                                               PRELIMINARY;
   27.9%;
   Score
Pred.
                                                                                                                                                                                                                                                                                                                                                                                                                                                               PRT;
   No. 6e-
                                                                                                                                                                                                                                                                                                                                                                                                                                                                 714
                                                                                                                                                                                                                                                                                                                                                                                                                                                                 A
                                                                                                                                                                                                                                                                                                                                                                                 protein)
                  DB
                                                                                                                                                                                                                                                                                                                                                                                                   update)
                  10;
                                                                                                                                                                                                                                                                                                                      pa; Tracheophyta;
Poaceae;
                  Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       636
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             392
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           412
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     296
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           677
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       568
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     591
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   512
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 531
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 452
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               471
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           337
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       352
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       278
```

Similarity

6e-59;

```
RESULT

ORANGE

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

AC QR

                                                                                                                                                                                                                                                                                                                                                                                                      5 5 5 B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                $
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Д
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         δÃ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             당양
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       멍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Вp
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          g
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Matches
                                                                                                           Oryza sativa (japonica cultivar-group).
Eukaryota; Viridiplantae; Streptophyta; Em
Spermatophyta; Magnoliophyta; Liliopsida;
Ehrhartoideae; Oryzeae; Oryza.
                                                                                                                                                                                   Q84VEO;
01-JUN-2003 (TrEMBLrel. 24, Created)
01-JUN-2003 (TrEMBLrel. 24, Last sequence update)
01-OCT-2003 (TrEMBLrel. 25, Last annotation updat
Phenylalanine ammonia-lyase
SEQUENCE FROM N.A.
STRAIN=cv. Nipponbare;
Cooper B., Hutchison D
Goff S., Glazebrook J.
                                                                                       NCBI_TaxID=39947;
                                                                                                                                                                                                                                                                                     Q84VE0
                                                                                                                                                                                                                                                                                                                                                                                                                                                        636
                                                                                                                                                                                                                                                                                                                                                                                169
                                                                                                                                                                                                                                                                                                                                                                                                                  707
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          647
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              578
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    909
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          527
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              546
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 467
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       486
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         407
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               427
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   347
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       367
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             295
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 313
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    235
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          255
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                178
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  195
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          127
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            136
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   267;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    78
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          13
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               18
                                                                                                                                                                                                                                                                                                                                                                              NOGKHIDALLECL 703
                                                                                                                                                                                                                                                                                                                                                                                                                KDGRINHVLVKML
                                                                                                                                                                                                                                                                                                                                                                                                                                                      RAAVENGTAAKANRITECRSYPLYRFVREELGT----EYLTGEKTRSPGEEVNKVFVAM
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      RFWQTPSSQAPAHAYLSPRTRVLYSFVREELGVQARRGDVFVGVQQETIGSNVSRIYEAI 706
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            DDPCSANYPLMQXWRAVLIEHALANGEAERNVD-TSVFA-KVATFEEELRVALPREVEAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    EENVRSAVKGCVTTVARKTLST----SATGDLHKARFCEKDLLQAIDREA----VFAYA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             LQFLANPVTNHVQSAEQHNQDVNSLGLISSRKTAEAIDVLKLMSSTFLIALCQAIDLRHL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           MEKTRLALALIGKLNFTQCTELLNAAMNRGLPSCLA-AEDPSLNYHGKGLDIHIAAYASE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         DRYPLRTSPQFLGPLVEDMYHAYSTLSLENUTTTDNPLLDVENKQTAHGGNFQASAVSIS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           KP-EYTDHLTHKLKHHPGQIEAAAIMEHILEGSSYMMLAKKLGELDPLMKPK-----Q
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    AFKIAGIQHGFFELQPKEGLAMVNGTAVGSGLASMVLFEANVLGVLAEVLSAVFCEVMNG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        AISLFGLE--AVVLGPKEGLGLVNGTAVSASMATLSLHDSHMLSLLSQALTALTVEAMVG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    ELDEKKQFDPLLPTLLQQHLGTGLDVNALALEVKKALNKRLEQTTTYDLEPRWHDAFSYA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   LGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQAVDLRAM
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       MDNTRLATAATGKLMFAQFSELVNDFYNNGLPSNLSGGRNPSLDYGFKGAETAMASYCSE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 DRYALRTSPOWLGPQIEVIRAATKSIEREINSVNDNPLIDVSRGKALHGGNPQGTPIGVS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               QQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAV-----EHEEEVKVKDDEGILRQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            ETTATLLNANVTPCLPLRGTTTASGDLVPLSYTAGLVTGRPN-SVAVTPDGRK--VDAAE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                EALTNFLNHRITPIVPLRGSISASGDLSPLSYIAGAITGHPDVKVHVLHEGTEKIMFARE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              VAAVASAG-AARVELDESARGRVKASSDWVMNSMMNGTDSYGVTTGFGATSHRRTKEGGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    VVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSV--YGVTTGFGGSADTRTEDAVS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           NGSHAAPTKSAAGPTSALRRTPGLDGHAAHQSQLEIVQELLSDPTDDVVELSGYSLTVRD
                                                                                                                                                                                                                                                                                   PRELIMINARY;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  -----TGTVVE--LLSSSPSANVTLTAVNAWKVASAEK--AISLTREVR-N
     ..
..
                   Ŭ.,
                     Park
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 130;
                     .
ເນ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Mismatches
                     Guimil
                                                                                                                                                                                                                                                                                     671
                                                                                                                                 Embryophyta; Tracheophyta;
a; Poales; Poaceae;
                   :
:
                                                                                                                                                                                                                                                                                   B
                                                                                                                                                                                                         update)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 263;
                 Luginbuhl P.,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Indels
                     Ellero
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 73;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Gaps
                   ი
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              635
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            605
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 526
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 545
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           485
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               366
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      177
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       466
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 406
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       426
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           346
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    294
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        312
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            234
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  254
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              126
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  135
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        67
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 21
RESULT
                                                       밁
                                                                             5
                                                                                                                   Вb
                                                                                                                                                         Ϋ́
                                                                                                                                                                                                       뮍
                                                                                                                                                                                                                                   δ
                                                                                                                                                                                                                                                                               В
                                                                                                                                                                                                                                                                                                             δ
                                                                                                                                                                                                                                                                                                                                                      밁
                                                                                                                                                                                                                                                                                                                                                                                      δ
                                                                                                                                                                                                                                                                                                                                                                                                                                뫄
                                                                                                                                                                                                                                                                                                                                                                                                                                                              ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       맑
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Query Match
Best Local Sim
Matches 257;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      GO; GO:0005737; C:cytoplasm; IEA.
GO; GO:0016211; F:ammonia ligase activity; IEA.
GO; GO:0016821; F:ammonia-lyase activity; IEA.
GO; GO:0016849; F:lyase activity; IEA.
GO; GO:0016829; F:lyase activity; IEA.
GO; GO:000559; P:phenylalanine catabolism; IE
InterPro; IPR00106948; L-Aspartase-like.
InterPro; IPR001106; Phe/His_NH31yase.
InterPro; IPR001216; Phe_am_lyase.
InterPro; IPR005522; Phe_am_lyase.
Pfam; PF00221; PhL; I
ITGRFAMS; TIGR01226; phe_am_lyase; 1.
PROSITE; PS00488; PAL_HISTIDASE; 1.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Lyase.
SEQUENCE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     "Identification of Rice (Oryza sativa) Proteins Linked wediated Regulation of the Cell Cycle.";
Submitted (JNN-2003) to the EMBL/GenBank/DDBJ databases
EMBL; AY224546; AAO72666.1; -
12
                                                                                                                               577
                                                                                                                                                                                                       522
                                                       632
                                                                                         691
                                                                                                                                                                   634
                                                                                                                                                                                                                                             589
                                                                                                                                                                                                                                                                                 467
                                                                                                                                                                                                                                                                                                                       529
                                                                                                                                                                                                                                                                                                                                                        407
                                                                                                                                                                                                                                                                                                                                                                                              469
                                                                                                                                                                                                                                                                                                                                                                                                                                  347
                                                                                                                                                                                                                                                                                                                                                                                                                                                                      410
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            287
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              350
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    229
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        290
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           172
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 232
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     112
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         172
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     114
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               57
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         H
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Similarity
                                                                                           QQETIGSNVSRIYEAIKDGRINHVLVKML
                                                                                                                                                     AEKAI--SLTREVRNRFWQTPSSQAP-AHAYLSPRTRVLYSFVREELGVQARRGDVFVGV
                                                                                                                                                                                                       TAIDREA----VSYADDPCSANYPIMTKIRAVIVEHALANGPAEKDDGSSVFS-KITA
                                                                                                                                                                                                                                                                                                                   LASHLYCTLQAVDLRAMELDFKKQFDFLLFTLLQQHLGTGLDVNALALEVKKALNKRLEQ
                                                                                                                                                                                                                                                                                                                                                                                      NYHGKGLDIHIAAYASELGHLANPVTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLL
                                                                                                                                                                                                                                                                                                                                                                                                                                GKALHGGNFQGTPIGVSMDNTRLAIANIGKLMFAQFSBLVNEFYNNGLTSNLAGGRNPSL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  HDSHMLSLLSQALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 LLSDPTDDVVELSGYSLTVRDV--VGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQN-
                                                       KLKSPGEECNKVFLAISERKLIDPMLECL
                                                                                                                                                                                                                                             TTTYDLEPRWHDAFSYATG---
                                                                                                                                                                                                                                                                                 SSTYLVALCQAVDLRHLEENLKSAVKNCVTTVAKKVLTTG---PAGGLHSARFSEKAL--
                                                                                                                                                                                                                                                                                                                                                        DYGFKGTEIAMASYCSELQFLANPVTNHVQSAEQHNQDVNSLGLVSARKTAEAVDILKLM
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            EHEEEVKVKDDEGILRQDRYPLRTSPQFLGPLVEDMMHAYSTLSLENNTTTDNPLLDVEN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         MVAQSREAVVKIEGSSLRVGQVAAVSAAKDASGVVVELDEEARPRVKASSEWILNCIAHG
                                                                                                                             FEEELREALPREMEAARVAFETGTAPITNRIKESRSFPLYRFVREELGCV-
                                                                                                                                                                                                                                                                                                                                                                                                                                                                    KQTAHGGNFQASAVSISMEKTRLALALIGKLNFTQCTELLNAAMNRGLPSCLA-AEDPSL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            PHAQKVNEVDPLLKPKODRYALRTSPOWLGPQIEVIRAATKSIEREVNSVNDNPVIDVHR
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  YDANVLAVLSEVLSAVFCEVMNGKP-EYTDHLTHKLKHHPGSIEAAAIMEHILAGSAF-M
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         TGRPNAQA-VTVDG--KKVDAAEAFKIAGIQGGFFRLEPKEGLAIVNGTSVGSALAAMVL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   TGHPDVKVHVLHEGTEKIMFAREAISLFGLEA--VVLGPKEGLGLVNGTAVSASMATLSL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             GDIYGVTTGFGGTSHRRTKDGQALQVELLRHLNAGI-----FGNGSDGNSLPSEVS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   -SVYGVTTGFGGSADTRTEDAVSLQKALIEHQLCGVTPTSXSSFSVGRGLE-NTLPLEVV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          671
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          AA,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          72277 MW;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              27.8%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               3%; Score 1003.5;
3%; Pred. No. 1e-:
138; Mismatches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          23F93B995CE21E60
                                                       660
                                                                                           719
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               le-58;
Thes 239; Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    HEA.
                                                                                                                                                                                                                           -TVVELLSSSPSANVTLTAVNAWKVAS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            IEA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    DB 10;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CRC64;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ö
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 the
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      671;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 წ
წ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Cyclin-
                                                                                                                               -YLTGE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Gaps
```

466

528

521

4 68

409

349 286 171 289

346

171

18;

```
Š
                                                                ğ
                                                                                                Š
                                                                                                                                      밁
                                                                                                                                                                Ş
                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                      Ś
                                                                                                                                                                                                                                                                           B
                                                                                                                                                                                                                                                                                                           Ş
                                                                                                                                                                                                                                                                                                                                                 뫄
                                                                                                                                                                                                                                                                                                                                                                             Ş
                                                                                                                                                                                                                                                                                                                                                                                                                    В
                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      g
g
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Query Match
Best Local Similarity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Matches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                "Phenylalanine ammonia-lyase gene expression in response to low temperature in mandarin fruit.";
Submitted (MAY-1999) to the EMBL/GenBank/DDBJ databases.
EMBL; AJ238753; CAB42793.1; -.
HSSP, P21310; 1B8F.
GO, GO,GO,GO
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Lyase.
SEQUENCE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           GO; GO:0005737; C:cytoplasm; IEA.
GO; GO:0005737; C:cytoplasm; IEA.
GO; GO:0016221; F:ammonia ligates activity; IEA.
GO; GO:0016829; F:lyase activity; IEA.
GO; GO:0045548; F:pheny-alanine ammonia-lyase activity; IEA.
GO; GO:0009558; P:biosynthesis; IEA.
GO; GO:0009558; P:biosynthesis; IEA.
GO; GO:0006559; P:pheny-ialanine catabolism; IEA.
InterPro; IPR008948; L-Aspartase-like.
InterPro; IPR001106; Phe/His NH31yase.
InterPro; IPR005922; Phe am lyase.
FinterPro; IPR005922; Phe am lyase.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   O9XFX5;
01.NOV-1999 (TrEMBLrel. 12, Created)
01-NOV-1999 (TrEMBLrel. 12, Last sequence update)
01-OCT-2003 (TrEMBLrel. 25, Last annotation update)
Phenylalanine-ammonia lyase (EC 4.3.1.5).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Pfam; PF00221; PAL; 1.
TIGRTAMS; TIGR01226; phe am lyase; 1.
PROSITE; PS00488; PAL_HISTIDASE; 1.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               STRAIN=cv. Fortune; TIS
Sanchez-Ballesta M.T.,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Eukaryota, Viridiplantae, Streptophyta; Embryophyta; Tracheophyta; Spermatophyta; Magnoliophyta; eddicotyledons; core eudicots; rosid eurosids II; Sapindales; Rutaceae; Citrus.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Q9XFX5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  SEQUENCE FROM N.A.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   NCBI_TaxID=93374;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Citrus clementina x Citrus reticulata
                               463
                                                                                                 403
                                                                                                                                      331
                                                                                                                                                                      343
                                                                                                                                                                                                         272
                                                                                                                                                                                                                                                                           216
                                                                                                                                                                                                                                                                                                              224
                                                                                                                                                                                                                                                                                                                                                 156
                                                                                                                                                                                                                                                                                                                                                                                 164
                                                                                                                                                                                                                                                                                                                                                                                                                    103
                                                                                                                                                                                                                                                                                                                                                                                                                                                       106
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              262;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        43
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          49
                                                                                                                                                                                                                                                                                                                                                HTLPHSATRAAMLVRVNTLLQGYSGIRFEILDAITKLLNHSITPCLPLRGTITASGDLVP
                                                                                                                                                                                                                                                                                                                                                                                 NTLPLEVVRGAMVIRVNSLTRGHSAVRLVVLEALTNFLNHRITPIVPLRGSISASGDLSP 223
GGRNPSLDYGFKGAEIAMASYCSELQFLANFVTNHVQSAEQHNQDVNSLGLISSRKTAEA
                                                                                                                                                                      SGSSFAVEHEEEVKVKDDEGILRQDRYPLRTSPQFLGPLVEDMMHAYSTLSLENNTTTDN
                                                                                                                                                                                                                                                                                                             LSYIAGAITGHPDVKVHVLHEGTE-KIMFAREAISLFGLEAVVLGPKEGLGLVNGTAVSA
                                                                                                                                                                                                                                                                                                                                                                                                                    WVMDSMNKGTDSYGVTTGFGATSHRRTQNGGALQKELIKFLNAGI----FGNGTKSS
                                                                                                                                                                                                                                                                                                                                                                                                                                                   FLKAQLQNSV--YGVTTGFGGSADTRTEDAVSLQKALIEHQLCGVTPTSXSSFSVGRGLE 163
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      SHLEEVKRMVAEYRKPVVNLGGETLTVAQVAAIATAGDVNAQVKVELSESAREGVKASSD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        SQLEIVQELLSDPTDDVVELSGYSLTVRDVVGAARKG---RRVRVQNDDEIRARVDKSVD
                             -AEDPSLNYHGKGLDIHIAAYASELGHLANPYTTFVQPAEMGNQAVNSLALISARRTAEA 521
                                                                  PLIDVSRNKALHGGNFOGTPIGVSMONTRLAIAAIGKLMFAOFSELVNDFYNNGLPSNLS
                                                                                                PLLDVENKQTAHGGNFQASAVSISMEKTRLALALIGKLNFTQCTELLNAAMNRGLPSCLA 462
                                                                                                                                    DGSSY-VKAAKKLHEIDPLQKPKQDRYALRTSPQWLGPQIEVIRFATKSIEREINSVNDN
                                                                                                                                                                                                         GLASMVLFDANNLALLSETLSATFABVMQGKP-EFTDHLTHKLKHHPGQTBAAAIMEHIL
                                                                                                                                                                                                                                        SMATLSLHDSHMLSLLSQALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLL
                                                                                                                                                                                                                                                                           LSYIAGLLTGRPNSKA----TGPNGEIIDAQEASKQAGFGFFELQPKEGLALVNGTAVGS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Fortune; TISSUE=Flavedo;
llesta M.T., Lafuente M.T.,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 721 AA;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Conservative 124; Mismatches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               PRELIMINARY;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 78429 MW; 97DBD6351A5FDAC5 CRC64;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          27.8%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Score 1002.5;
Pred. No. 1.3e
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               PRT;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              721
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             5; DB 10; Length .3e-58;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             253; Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           61; Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  low
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      rosids;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          105
                                                                                                                                                                      402
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      102
                                                                                                                                                                                                                                          342
                                                                                                                                                                                                                                                                           271
                                                                                                                                                                                                                                                                                                              282
                                                                                                                                                                                                                                                                                                                                                                                                                    155
                                                                                                                                      389
                                                                                                                                                                                                         330
                                                                                                                                                                                                                                                                                                                                                 215
509
                                                                  449
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             18;
```

```
RESULT 13
Q8GZR8
밁
                                              Ś
                                                                                                         밁
                                                                                                                                                                Ş
                                                                                                                                                                                                                                 B
                                                                                                                                                                                                                                                                         Ş
                                                                                                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      ALD COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCION STANCE COCCOCCI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ş
                                                                                                                                                                                                                                                                                                                                                                                                  Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                       Query Match
Best Local Similarity
Matches 256; Conserv
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 EMBL; AF411134; AAO13347.1; -.
GO; GO:0005737; C:cytcoplasm; IEA.
GO; GO:0016211; F:ammonia ligase activity; IEA.
GO; GO:0016841; F:ammonia-lyase activity; IEA.
GO; GO:0016829; F:lyase activity; IEA.
GO; GO:0006589; P:biosynthesis; IEA.
GO; GO:0006589; P:phenylalanine catabolism; IE
InterPro; IPR000948; L-Aspartase-like
InterPro; IPR001106; Phe/His NH31yase.
InterPro; IPR005922; Phe am Tyase.
InterPro; IPR005922; Phe am Tyase.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Q8GZR8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Lyase.
SEQUENCE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     01-MAR-2003 (TrEMBLrel. 23, Created)
01-MAR-2003 (TrEMBLrel. 23, Last sequence update)
01-CCT-2003 (TrEMBLrel. 25, Last annotation update)
Phenylalanine ammonia-lyase2.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Lactuca sativa (Garden lettuce).

Bukaryota; Viridiplantae; Streptophyta; Embryophyta; Tracheophyta;

Spermatophyta; Magnoliophyta; endicotyledons; core eudicots; asterids;

campanulids; Asterales; Asteraceae; Cichorioideae; Cichorieae;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 TIGRFAMS; TIGR01226; phe_am_lyase; 1.
PROSITE; PS00488; PAL_HISTIDASE; 1.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Pfam; PF00221; PAL; 1.
TIGRFAMS; TIGR01226; F
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Campos-Vargas R., Nonogaki H., Suslow T., Saltveit M.E. "Characterization of a second phenylalanine ammonia-lya in wounded lettuce leaf tissue.";
Submitted (AUG-2001) to the EMBL/GenBank/DDBJ databases
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   SEQUENCE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 NCBI_TaxID=4236;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             621
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     624
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                567
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               510
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          522
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      089
                                                                                                                                                                                                                                                                                         99
                                                                                                                                                                                                                                                                                                                                                                                                           40
                                                                                                               GNGTESTHTLPHSATRAAMLVRINTLLQGYSGIRFEILEAITKFLNHNVTPFLPLRGTIT
                                                                                                                                              RVDKSVDFLKAQLQNSV--YGVTTGFGGSADTRTEDAVSLQKALIEHQLCGVTPTSXSSF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                FROM N.A.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     TAVNAWKVASAEKAIS--LTREVRNRFWQTPSSQAPA--HAYLSPRTRVLYSFVREELGV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        LNKRLEQTTTYDLEPRWHDAFSY----ATGTVVELL-----
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            VDILKLMSSTFLVALCQAIDLRHLEENLKHTVKDTVSQVARKVLTVGANGE---LHPSRF
                                                                                                                                                                                                                                 GVKASSDWVMESMNKGTDSYGVTTGFGATSHRRTKEGGALQKELIRFLNAGI-----F
                                                                                                                                                                                                                                                                                                                                                                                                     GLDGHAAHQSQLEIVQELLSDFTDDVVELSGYSLTVRDVVG-AARKGRRVRVQNDDEIRA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                FQ----KIAAFEEELKAVLPKEVENA-RQTVENGNPTIPNRIKECRSYPLYRLVREELGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CEKDLLKAA-----DREH-VFAYIDDPCSATYPLMQKLRQVLVEHALNNGENEKNANSSI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       NDVLSLLLASHLYCTLQAVDLRAMELDFKKQFDPLLPTLLQQHLGTGLDVNALALEVKKA
ASGDLVPLSYIAGLLTGRANSKA----VGPTGEVLNAEKAFAEAGVEGGFFELQPKEGLAL
                                                                                                                                                                                                                                                                                                                                                 GMAAESLKGSHLDEVKRMVAEFRKPVVRLGGETLTVSQVAAIAASDNAGVKVELSETARA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   QARRGDVFVGVQQETIGSNVSRIYEAIKDGRINHVLVKML
                                                 ASGDLSPLSYIAGAITGHPDVKVHVLHEGTEXIMFAREAISLFGLEA--VVLGPKEGLGL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      713 AA;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                PRELIMINARY;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 -NFLTGEKVTSPGEKFDKVFTAMCQGKIIDPMLECL 710
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      77657 MW; 87751A2ED7349E61 CRC64;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                27.6%; Score 998; DB 10; 36.8%; Pred. No. 2.6e-58; tive 122; Mismatches 264;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                PRT;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                713
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                AA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              IEA.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             IEA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          IEA.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     ammonia-lyase
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Length 713;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      719
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    .
H
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           ---SSSPSANVTL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                      54.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           (PAL)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     gene
                                                                                                                                                                                                                                                                                            156
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        679
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   620
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        623
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  ს
ნ
ნ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             581
                                                                                                                                                                          216
                                                                                                                                                                                                                                    141
                                                                                                                                                                                                                                                                                                                                                    88
                                                                                                                                                                                                                                                                                                                                                                                                              98
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                675
   258
                                                          274
                                                                                                                  201
```

61 141

```
QRESULT
ORDER
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTROL
OF CONTR
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      B 8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    뫄
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  B 65 B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         망
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Q
  Query Match
Best Local Sim
Matches 262;
                                                                                                                                                              EMBL; L77912; AAL40137.1; -...

GO; GO:0005737; C:cytoplasm; IEA.

GO; GO:001621; F:ammonia ligase activity; IEA.

GO; GO:0016829; F:lyase activity; IEA.

GO; GO:0016829; F:lyase activity; IEA.

GO; GO:00045549; F:phenylalanine ammonia-lyase activity; IEA.

GO; GO:00045549; F:phenylalanine catabolism; IEA.

GO; GO:0006559; P:phenylalanine catabolism; IEA.

InterPro; IPRO08948; L-Aspartase-like.

InterPro; IPRO08948; L-Aspartase-like.

InterPro; IPRO08948; L-Aspartase-like.

InterPro; IPRO08948; Pheam_Tyase.

Pfam; PF00221; PAL; 1.

PGCRPAMS; TIGR01226; Phe_am_Tyase; 1.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        OBVXG7; PRELIMINARY;
OBVXG7;
OL-MAR-2002 (TrEMBLrel. 20, LO1-MAR-2002 (TrEMBLrel. 25, LO1-OCT-2003 (TEMBLrel. 25, LPhenylalanine ammonia-lyase (Zea mays (Maize).
                                                                                             Lyase.
SEQUENCE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            SEQUENCE FROM N.A.
STRAIN=CV. COrso;
MEDLINE=97161122;
Rosler J., Krekel F., Amrhein N., S
"Maize phenylalanine ammonia-lyase
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Eukaryota; Viridiplantae; Streptophyta; En
Spermatophyta; Magnoliophyta; Liliopsida;
PACCAD clade; Panicoideae; Andropogoneae;
                                                                                                                                            PROSITE;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                activity.";
Plant Physiol. 113:175-179(1997).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           NCBI_TaxID=4577;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              14
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     676
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  619
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 437
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      664
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    809
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    555
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  574
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    497
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                514
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                455
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 377
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                395
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              318
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             335
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              259
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           275
                         Similarity
                                                                                                                                              PS00488;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  ELGVQARRGDVFVGVQQETIGSNVSRIYEAIKDGRI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                LALEVKKALNKRLEQ-----
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            SARKTAESVEILKLMSTTYLVALCQSIDLRHLEENLKSTVKNTVSLVAKKILTTG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             SARRTAEANDVISILLASHIYCTIQAVDIRAMELDFKKQFDFLLPTILQQHIGTGIDVNA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           RGLPSCLA-AEDPSLNYHGKGLDIHIAAYASELGHLANPVTTFVQPAEMGNQAVNSLALI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            EINSVNDNPLIDVSRNKALHGGNFOGTPIGVSMDNTRLAIAAIGKLMFAOFSELVNDFYN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     ENNTTTDNPLLDVENKQTAHGGNFQASAVSISMEKTRLALALIGKLNFTQCTELLNAAMN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       AAIMEYILDGSDY-VKAAQKVHEMDPLQKPKQDRYALRTSPQWLGPQIEVIRSSTKMIER
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       VNGTAVGSGMASMVLFDANVLALLSEVLSAIFAEVMQGKP-EFTDHLTHKLKHHPGQIEA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    AGTSIFQ----KISEFEEELKAVLPKEVEGVRSAYESSTLTIPNRIKECRSYPLYRFVRE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                ANVTLTAVNAWKVASAEKAIS--LTREVRN-RFWQTPSSQAPAHAYLSPRTRVLYSFVRE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              NGLPSNLSGGRNPSLDYGFKGAEIAMASYCSELQFLANPVTNHVQSAEQHNQDVNSLGLI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        ARNIRTLLSGSSFAVEHEEEVKVKDDEGILRQDRYPLRTSPQFLGPLVEDMMHAYSTLSL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     VNGTAVSASMATLSLHDSHMLSLLSQALTALTVEAMVGQQGSFAPFIHDVCRPHPGQVEV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 -ELHPSRFCEKDLLRVVDREYVFAYIDDACSATYPLMQKLRQVI-----
                                                                                                  703
     Conservative
                                                                                               Æ;
                                                                                                                                              26; phe_am_lyase;
PAL_HISTIDASE; 1.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    GFLTGEEVTSPGEEFDKVFTALCKGHI
                         27.6%;
                                                                                                  74926
                                                                                                  MW.
Score 997.5; 1
Pred. No. 2.8e
33; Mismatches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Last sequence up Last annotation (EC 4.3.1.5).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Created)
                                                                                                  11374FD68516971E
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Schmid J.;
e has tyrosine
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  -----TTTYDLEPRWHDAFSYATGTVVELLSSSPS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               703
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Embryophyta; Trach
a; Poales; Poaceae;
e; Zea.
                         . 8e-
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            .on update)
                                              DB 10;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      694
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     711
                                                                                                  CRC64
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  ammonia-lyase
  Indels
                                              Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Tracheophyta;
                                                                                                                                                                                                                                                                                                                                            IEA.
                                                 703;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 - VDHALNNEND
  93;
Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 -- VNG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                573
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 496
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           334
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    663
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     675
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 607
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             618
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              554
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             513
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              436
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             454
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              376
  21;
RESERVED AND CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL O
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          뭥
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          멍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               뭕
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Db
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Š
  SEQUENCE FROM N.A.
Kim J.-B., Kim J.-B.
"Molecular Cloning a
"Molecular Cloning a
                                                                                                                                                                                                                                                              Q9ATN7
Q9ATN7;
Q9ATN7;
01-JUN-2001 (T)
01-JUN-2001 (T)
01-OCT-2003 (T)
Phenylalanine a
                                                                                                               NCBI_TaxID=39271;
                                                                                                                                      Agastache rugosa.
Eukaryota; Viridiplantae; Streptophyta; Embryophyta; Tracheophyta;
Spermatophyta; Magnoliophyta; eudicotyledons; core eudicots; asterids;
lamiids; Lamiales; Lamiaceae; Nepetoideae; Mentheae; Agastache.
                                                                                                                                                                                                                                                                                                                                                                                                                                      15
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    682
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                869
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               625
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                658
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               568
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              617
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            523
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           557
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            467
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              497
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            407
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           438
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          347
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        378
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          290
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          174
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        320
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       231
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   262
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      202
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       122
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        142
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       62
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   84
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 29
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    N
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    LVDPMLECLKEWDGK
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            GVAEGTAPVANRIADSRSFPLYRFVREELGCVFLTGERLKSPGEECNKVFVGISQ-
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          GKLNFTQCTELLNAAMNRGLPSCLA-AEDPSLNYHGKGLDIHIAAYASELGHLANPYTTF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                NVSRIYEAIK--DGR
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               DAASASLPIMQKLRAVIVDHALSSGERGAGALRVIQDHQVRG--
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              PSANVTLTAVNAWKVASAEKAIS------LTREVRNRFWQTPSSQAP-----
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               VKNTVTQVAKKVLTMNPSG-ELSSARFSEKELISAIDREA----VFTYA-----
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           LPTLLQQHLGTGLDVNALALEVKKALNKRLEQTTTYDLEPRWHDAFSYATGTVVELLSSS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   VQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQAVDLRAMELDFKKQFDPL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       LGPQIEVIRAATKSIEREVNSVNDNPVIDVHRGKALHGGNFQGTPIGVSMDNARLAIANI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        LGPLVEDMMHAYSTLSLENNTTTDNPLLDVENKQTAHGGNFQASAVSISMEKTRLALALI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          HLTHKLKHHPGSIEAAAIMEHILDGSSEM----KQAKKVNELDPLLKPKQDRYALRTSPQW
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      FIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEVKVKDDEGIL--RQDRYPLRTSPQF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      EA--VVLGPKEGLGLVNGTAVSASMATLSLHDSHMLSLLSQALTALTVEAMVGOQGSFAP
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       NHRITPIVPLRGSISASGDLSPLSYIAGAITGHPDVKVHVLHEGTEKIMFAREAISLFGL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       RHLNAGIFGTGSDG-----HTLPSEVTRAAMLVRINTLLQGYSGIRFEILEAITKLL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         EHQLCGVTPTSXSSFSVGRGLENTLPLEVVRGAMVIRVNSLTRGHSAVRLVVLEALTNFL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       DASGVAVELDEEARPRVKASSEWILDCIAHGGDIYGVTTGFGGTSHRRTKDGPALQVELL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    KGRRVRVQNDDEIRARVDKSVDFLKAQLQN--SVYGVTTGFGGSADTRTEDAVSLQKALI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               AGNGAIVESDPLNWGAAAABLAGSHLDEVKRMVAQARQPVVXIEGSTLRVGQVAAVASAK
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              AGPTSALRRTPGLDGHAAHQ----SQLEIVQELLSDPTDDVVELSGYSLTVRDV--VGAAR
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               VOSADEHNODVNSLGLVSARKTAEAIDILKLMSSTYIVALCQAVDLRHLEENIKAS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       EGGFFKLNPKEGLAIVNGTSVGSALAATVMYDANVLAVLSEVLSAVFCEVMNGKP-EYTD
                                                                                                                                                                                                                                                                1 (TrEMBLrel. 17, 0
1 (TrEMBLrel. 17, 1
3 (TrEMBLrel. 25, 1
ine ammonia-lyase.
                                                                                                                                                                                                                                                                                                                                                                                             PRELIMINARY;
                                                 . -В.,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           AHAYLSPRTRVLYSFVREELGVQARRGD-----
  B., Cho K.-J., Woon U., Ha S.-H.; and Characterization of Phenylalar to the Biosynthesis of Rosmarinic
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    696
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                710
                                                                                                                                                                                                                                                                                        Created)
Last sequence update)
Last annotation updat
                                                                                                                                                                                                                                                                                                                                                                                             PRT;
                                                                                                                                                                                                                                                                                                                                                                                             8
                         Ha S.-H.;
f Phenylalanine
                                                                                                                                                                                                                                                                                          update)
     acid
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               GAPRGAAPGGGGRPR
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                VEVGVQQETIGS
     ij
     Agastache
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  .
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       얁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               H
```

616

6 9 7 4 7

4 4 0 0 0 0 0 0 0

522

346

319 289 201 173 261

RATURE TO THE PROPERTY OF THE

```
L Submitted (DEC-2000) to the EMBL/GenBank/DDBJ databases.

R MBB; AF326115; AAX15640.1; -.

R HSSP; P21310; 1B8F;

R GO; GO:0005737; C:cytoplasm; IEA.

GO; GO:0016211; F:ammonia ligase activity; IEA.

GO; GO:0016841; F:ammonia-lyase activity; IEA.

R GO; GO:0016842; F:lyase activity; IEA.

R GO; GO:0016892; F:lyase activity; IEA.

R GO; GO:000559; P:biosynthesis; IEA.

R GO; GO:000559; P:phenylalanine catabolism; IEA.

R InterPro; IPR008948; L-Aspartase-like.

R InterPro; IPR008948; L-Aspartase-like.

R InterPro; IPR001092; Phe_am_lyase.

R FIGRFAMS; TIGR01226; Phe_am_lyase; 1.

R PROSITE; PS00488; PAL_HISTIDASE; 1.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Query Match
Best Local
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Matches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Lyase.
SEQUENCE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            rugosa.";
Submitted
                                                                                                                                                                                                                                                                                     531
                                                                                                                                                                                                                                                                                                                     548 DFKKQFDPLLPTLLQQHLGTGLDVNALALEVKKALNKRLEQTTTYDLEPRWHDA-----
                                                                                                                                                                                                                                                                                                                                                                                            471
                                                                                                                                                                                                                                                                                                                                                                                                                     488 HLANPYTTFVQPAEMGNQAVNSLALISARRTAEANDVLSLLLASHLYCTLQAVDLRAMEL 547
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              411
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         429 KTRLALALIGKLNFTQCTELLNAAMNRGLPSCLA-AEDPSLNYHGKGLDIHIAAYASELG 487
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   351
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 369 YPLRTSPOFLGPLVEDMMHAYSTLSLENNTTTDNPLLDVENKOTAHGGNFOASAVSISME 428
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  293 VWNGKP-EFTDHLTHKLKHHPGQIEAAAIMEHILDGSGY-VKAAQKLHEIDPLQKPKQDR
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            233
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    251 FAREAISLFGLEA--VVLGPXEGLGLVNGTAVSASMATLSLHDSHMLSLLSQALTALTVE 308
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                176
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  123
695 IGSNVSRIYEAIKDGRINHVLVKML 719
                                                                                                                                                                                                                                       602
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     309 AMVGQQGSFAPFIHDVCRPHPGQVEVARNIRTLLSGSSFAVEHEEEVKVKDDEGILRQDR
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               191 LVVLEALTNELNHRITPIVPLRGSISASGDLSPLSYIAGAITGHPDVKVHVLHEGTEKIM 250
                                                                                                                                  636 KAISITREVRN-RFWQTPSSQAPAHAYLSPRTRVLYSFVREELGVQARRGDVFVGVQQET
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 63 LTISQVAAIAAKDNAVAVELAESARAGVKASSDWVMDSMSKGTDSYGVTTGFGATSHRRT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        73
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       13 ANGFTNGSHAAPTKSAAGPTSALRRTPGLDGHAAHQSQLEIVQELLSDPTDDVVELSGYS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           9
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Similarity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             TAEQAFKLAGVTGGFFDLQPKEGLALVNGTAVGSGLASIALFDANVLAVLSVVMSPVFAE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        FEILEAITKFLNQNVTPCLPLRGTITASGDLVPLSYIAGLLTGRPNSKA-VGPAG--EPL
                                                                                                                                                                                                                                                                                                                                                                                         FLVNPVTNHVQSAEQHNQDVNSLGLISSRKTVEALDILKLMSSTYLVALCQAVDLRHVEE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           NTRLAIASIGKLLFAOFSELVNDFYNNGLPSNLSGGRNPSLDYGFKGSEIAMASYCSELO
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     LTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSV--YGVTTGFGGSADTRT
                                                                                 LKALLPKEVESARIALESGSPÄVÄNRIEECRSFPLYKFIREELGTGFLTGEKÄV----S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   YALRTSPQWLGPQIEVIRTATKMIEREINSVNDNPLIDVSRNKAIHGGNFQGTPIGVSMD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         SNGHNNGANGFCVKQ-NDPLNWAAAAESLKG----SHLEEVKRMVEEFRKPVVKLGGET
                                                                                                                                                                                      LIRVVDREYVFTYIDDPCLATYPLMQKLRQVLVDHALKNGESEKNVSTSIFHKIEAFEEE
                                                                                                                                                                                                                                    -----FSY-----ATGTVVE-----LLSSSPSANVTLTAVNAWKVASAE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               716 AA; 77487 MW; 9903F33B8CFD2958 CRC64;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        27.6%; Score 997; DB 10; Length 716; ilarity 35.2%; Pred. No. 3.1e-58; Conservative 126; Mismatches 271; Indels 8
                                                                                                                                                                                                                                                                                        -----LAVKNTVSQVAKRTLTMGVNGELHPSRFCEKE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 122
                                                                                                                                  694
                                                                                                                                                                                                                                                                                        565
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              470
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   410
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       350
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     368
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         292
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           232
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     130
                                                                                                                                                                                   625
                                                                                                                                                                                                                                                                                                                                      601
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         62
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           16;
```

맑 Š 밁 8 뮹 Ś 밁 S 맑 S 8 8 В δÃ B á 밁 S D, Ş 밁 Š 밁

Db 681 PGEECEKVFAALSNGLIIDPLLECL 705

Search completed: September 9, 2004, 10:07:42 Job time : 91.6349 secs

a		<i>3.</i>	

```
Minimum DB
Maximum DB
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Database
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Post-processing: Minimum Match 0%
Maximum Match 100%
Listing first 45 summaries
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Searched:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Scoring table:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Sequence:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Total number of hits satisfying chosen parameters:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Title:
Perfect score:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Run on:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    OM nucleic - nucleic search, using sw model
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    seq length: 0 seq length: 2000000000
              3470272 seqs, 21671516995 residues
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         IDENTITY_NUC Gapop 10.0 , Gapext 1.0
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        US-09-939-408A-20
2475
1 atggcccctccntcgactc.....nnnnnnnnnnnnnnnnnnnn 2475
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            September 11, 2004, 10:06:53; Search time 15236.4 Seconds (without alignments) 7040.653 Million cell updates/sec
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          GenEmbl: *
gb_ov:*
gb_pat:*
gb_ph:*
gb_ph:*
gb_pt:*
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GenCore version 5.1.6 Copyright (c) 1993 - 2004 Compugen Ltd.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   6940544
```

Pred. No. is the number of results predicted by chance to have a

JOURNAL

Patent: US 6355468-A 20 12-MAR-2002;

score greater than or equal to the score of the result being printed, and is derived by analysis of the total score distribution.

## SUMMARIES

		ρ			SOMMERCIES	
Result No.	Score	Query Match	Length	DB	ID	μi.
1	12	9 !	24	٥į	AR199606	99606 Sequ
٠	212	יס מ	47	n on	AX366868	66868 Sequenc
⊢ ⊢	99	00 0	4 4	თ თ	AX366866	66866 Seguenc
, д	77.	7	ω,	σ,	E01783	783 DNA sequen
۰,	77.	٦,7	u u	n on	E01784	784 DNA sequer
88 \		7	376	<b>ω</b> σ	RTPALGNA	702 R.
φ u	29	n 55	41	, o	AR199602	99602 Sequence
<u>, , , , , , , , , , , , , , , , , , , </u>	26.	ຫຸ	1 £	o 0	F01759	759 DNA encod
2 1	26.	5	15	σ,	AR205032	05032 Sequence
	26.	ı yı	15	י סי	AR282639	82639 Sequenc
5 <sub>4</sub>	ი ი	<b>ა</b>	155	0 0	AX370659	70659 Sequenc
6 1	23.	5	15	σ,	E01543	543 L-phenyla
0 7	3 23	ıΩ	15	ח ש	AR205031	05031 Sequenc
9 1	23.	υ·	15 t	o 0	AX082542	82542 Seguenc
0	23	UT!	15	6	AX370657	70657 Sequenc
2	10.	n u	2 6	ש פ	AK282658	70681 Seguenc
3 1	98.	4	78	6	AR199604	99604 Seguenc
4 r∪ –	98. 125	۰.	3 C	ထင	RTPAL2	513 Rhodospori
10	: ::	9	98	0	RHDPAL	261 R. torulo
8 ~ 	24.	<u></u> თ თ	74 4	σ, α	AX366876	66876 Sequence
9	, -		41	00	MZEPAL	912 Zea mays
1	44.	۵.	280	σ 0	AX654420	54420 Seguence
n N		٦.٦	12	ש ע	AX653389	53389 Seguenc
.4.	42.	7 :	51	ω (	AK100346	00346 Oryza sa
ı Uī	40.	١.	20	, ω	AY224546	24546 Oryza s
<b>1</b> 0	ω 4. 4.	7.7	128	თ თ	AX660254 AX660228	60254 60228
ယ 8	29.	7	3922	œ		31629 Oryza sa
OΦ	29.	٠, ١	4.0 0.0	ာ ထ	OSJN00262	31616 Oryza sa
- 4 - 4	26.	۷:	5449	N	AP005070	05070 Oryza sa
N	26.	7.	6595	ω	AP006523	06523 Oryza sa
Δ. ω	3 22	1.7	7018	o 10	AC135419	35419 Oryza sa
4 4 U 4	421.8		441	σο σ	OSPAL	99 Rice gene
					ALIGNMENTS	
RESULT 1 AR199606	-	5			ว่า ก	Ú
DEFINITION	N Seq	uence 2	0 from	pat	ent US 6355468.	
VERSION	A.	960	. GI:20	249	680	
SOURCE	s 클립·	O Win				
1511	2	assi	ed.			
REFERENCE	Yos.	bases ida R	1 to 24	K00	tstra. A	
ITLE	א הו	) a	ne amm	on in	lyase polypeptide a	Ö
TOTIONAL	7 t	- 6		2 C	or operative and us	u u

, 04 VQ	dg VQ	g Q	Db Qy	B Q	Qy Db	d da	Qy da	gg Qg	Db Qy	Db dy	g dy	A A	Qy Db	DB 02	gg Qy	Query Ma Best Loc Matches	ORIGIN	FEATURES
901 TCGCAGGCGCTCACGGCTCTNACGGTCGAGGCCATGGTCGGCCACGCCGGCTCGTTCCAC 960	841 GCCGTCTCCGCCTCGATGGCGACCCTCGCCTCTGCACGACGCACACATGCTCTCCGCTCCTC 900	781 TINGGTCTCGAGCCCGTCGTCCTCGGCCCGAAGGAGGTCTCGGTCTCGTCAACGGCACG 840	721 GTNCACGTNNTNCACGAGGCCANNGAGAAGATCATGTNCGCCCGCGAGGCGATCGCGCTC 780	661 GGCGACCTCTCCCCCNCTCTCNTACATCGCCGCCCCCGCACCCGGGTCACCCGGGACNNCAAG 720	601 AACTTCCTCAACCACGGGATCACCCCCATCGTCCCCCTCCGCGGGACCATCTCGGCGTCG 660	541 GTCAACTCGCTCACNCGCGGCCACTCGGCNGTCCGCCTCGTCGTCCTCGAGGCGCTCACC 600 541 GTCAACTCGCTCACNCGCGGCCACTCGGCNGTCCGCCTCGTCGTCCTCGAGGCGCTCACC 600	481 GGNCGCGGCCTCGAGAACTCGCTTCCGCTCGAGGTCCGTCCGCGGGCGCCATGACCATCCGC 540	421 GCNCTCCTCGAGCACCAGCTCTGCGGTGTNCTCCCNACGTCGNTCGANTCCTTCNGCCTC 480	361 ACGACTGGTTTCGGCCGGCCCGACACCCCGGACTGAGGATGCNATCTCGCTCCAGAAG 420	301 AAGATCGACAANAGNGTCGAGTTCCTCCGNNCNCAGCTCNACAACAGNGTCTACGGNGTC 360	241 TCGGCGCCGCNCGCAAGGGCCGCNCNGTCCGCGGTCNCAGACAGNCGACGAGATCCGCGCA 300	181 ACCCCACCGNNACGNACGNNNTCGAACTCGACGGGTACACCCTCACCCTCGGNGACGTCG 240	121 GCTCGCTCCCGGACCACCCAGNNGACGCAGCTCGACATCGTNGAGNAGATCCTCGCCG 180	61 CACGCCGNNCCGNCNNNGNCGNCNACGGGGGCGCCACGTCCACNCTCNGNCGGCCGNCGCNG 120	1 ATGGCCCCTCCNTCGACTCGATCGCGACCTCGNTCGCCAACGGCNTCNCNAACGGNTNG 60	y Match 86.0%; Score 2128; DB 6; Length 2475; Local Similarity 100.0%; Pred. No. 7.4e-224; hes 2408; Conservative 0; Mismatches () Indels 0; Gaps 0;	e /ors	•
₽ 2	S B 1	OV B	S B 4	S & %	\$ \$ <b>\$</b>	B &	P 5	Q B &	S B &	Db K	S B 7	S B &	?	S B 1	₹ F #	S & %	S B &	?
981 CGTCGTCGCCCGCGCGCTCNCGTACCTCTCGCCGCGCACGCGCGCGCGCGTACTCGTTCG					ט איים	b21 CAGGECGICGACCIICGECGGAIGGAGIICGAGGIICAGGAGGIICAGGAGGIICGAGGIICGAGCIICGACCCGNINNIC	561 ACNGCCGAGGCCAACGACGTCCTTTCTCTCCTCGCCACCCACC	CAUCHGLAGARA COULTING COULTING COURT	THE CONSCINENCE OF THE CONTROL OF TH	381 CONTCCTGCCTGCCGAGGACCCNTCGCTTCCTATCACTAACGGCCTCCACATT	321 GGCAAGCTCAACTTCACGCAAGACCCNTCGCTCCCTATCACTGCAAGGGCCTCGACATT	1   CACABECTERACTERACEGAGETERACEGAGATGETERACEGEGGGATGAACEGETET 1	201 TCGACGACCACCACCACCACCACCACACACACACACACAC	141 GGCCCGCTCGTCAACGACAATGATTCAACGACCACGCCACGCCACGCCTCCTCGCTCG	081 GACCCGCTCGTCAGCGACATGATTCACCGCCCACGCNGTCCTCTCGCTCGAGGCCGGNCAG		Sel CONTICCTCCACCACGACGACGACGACGACCCAGATCGAGGAGGAGGAGGAGACATC 1   Sel CONTICCTCCACGACGAGGACCCAGAACCATC   Sel CONTICCTCCACGACGACCCAGATCGAGGAGGAGATCAACATC 1   Sel CONTICCTCCACGACGAGATCGAGATCGAGGAGGAGATCAACATC 1   Sel CONTICCTCCACGACGAGATCGAGGAGGAGGAGATCAAGATCAAGATCAACATCAACATCAACAACAACAACAACAACAACAACA	KA JAGOROPO PROTESTA PORTRADA CO CARROPO CA COLLO PORTRADA ROLLO CARROPA PORTRADA RA CALLO PROTESTA PORTRADA P

181 ACCCCACCGNNACGNACGNNNTCGAACTCGACGGGTACACCCTCACCCTCGGNGACGTCG 2	ц ц ц	Qy 1 ATGGCCCCTCCNTGGACTGGGACCTCGNTGCCACGGCTCNCNAACGGNING 6	96.0%; Score 2128; DB 6; Length 2475; Local Similarity 100.0%; Pred. No. 7.4e-224; hes 2408; Conservative 0; Mismatches 0; Indels 0; Gaps	/mol type="unassigned DNA"  /mol type="unassigned DNA"  /db xref="taxon:32630"  /note="Consensus Sequence of SEQ ID NOs: 12, 16, and 18	TURES	AUTHORS TITLE	SOURCE synthetic construct ORGANISM synthetic construct artificial sequences.	INITION Sequence 20 from Patent W00208402.  ESSION AX366868  SION AX366868.1 GI:18698157	2475 hp TWN linear DAT 15-FFB-2	Qy 2401 NNNANAAA 2408          Db 2401 NNNANAAA 2408	QY 2341 NGTNINCANINACNCNTININININANNCHGGNANNGANTNINANGNITHCGNGNINCNINININ 2-	QY 2281 THNNHCHTHNCTCHCHUNNAHACHNGTCHNTHNHNHCHNHGHNTHNHNHNHCHHNC 2:  Db 2281 THNHHCHTHNCTCHCHNHNHAHCHNGTCHNTHNHNHNHCHHNHGHNHNC 2:	OY 2221 NUNCCUMNINUNNICTNTTINGNNITCGINTCNTGNCHNINNINGGGAINITHNCHNCHNINNINN 2:	QY 2161 ACGTCCTCGTCAAGATGCTCGCNTAGNNNCNCNNNCNANNCTCGCNTNNNNNCCCNNNCNC 2:	Qy 2101 TGACGATCGGCACCAACGTCTCCCGCATCTACGAGGCCATCAAGNNCGGCNGCATCAACC 2:	Qy 2041 TCCGCGAGGAGCTCGGCGTCAAGGCCCGCCGCGGCGACGTCTTCCTCGGCAAGCAGGAGG 2:
44	18 12 12 0 0 0 0	60	0								2400	2340	2280	2220	2160	2100
O D OY	עע ע	P	Q B Q	Qy db	da YO	g Qy	g Sy	D Qy	g Vy	dg VQ	A A	Qy dd	Qy Db	Qy	Qy db	Qy Db
1261 TICCAGGCGNCGCCTGTCGCNAACACGATGGAGAAGACTCGCCTCGC	PACCEGETCATEGACGTCGAGAACAAGANGACCCACCACGGCGGCAAC 1	1081 GACGACGAGGGCATTCTCCGCCAGGACCGCTACCCGCTCCGCACGCCTCAGTGGCTC 1140  1141 GGCCCGCTCGTCAGCGACATTGATTCACGCCCACGCNGTCCTCTCGTCGACGCCGGNCAG 1200  1141 GGCCCGCTCGTCAGCGACATGATTCACGCCCACGCNGTCCTCTCGACGCCGGNCAG 1200	1021 CGCACGCTCCTCGAGGGCAGCNNGTTTGCCGTCCACCACGAGGAGGAGGAGGTCAAGGTCAAG 1080	961 CONTICCTCCACGACGTCACGCGCCCTCACCCGACCCAGATCGAGGTCGAGGTCGCGCGCAACATC 1020	901 TCGCAGGCGCTCACGGCTCTNACGGTCGAGGCCATGGTCGGCCACGCCGGCTCGTTCCAC 960	841 GCCGTCTCCGCCTCGATGGCGACCCTCGCTCTGCACGACGACACATGCTCTCGCTCCTC 900	781 TINGGICTCGAGCCCGTCGICCTCGGCCCGAAGGAGGTCTCGGICTCGICAACGGCACG 840	721 GTNCACGTNNTNCACGAGGGCANNGAGAAGATCATGTNCGCCCGCGAGGCGATCGCGCTC 780	661 GGCGACCTCTCCCCCNCTCTCNTACATCGCCGCCGCCATCACCGGTCACCCGGACNNCAAG 720	601 AACTICCTCAACCACGGCATCACCCCCATCGTCCCCCCTCCGGGGCACCATCTCGGCGTCG 660	541 GTCAACTCGCTCACNCGCGGCCCACTCGGCNGTCCGCCTCGTCGTCCTCGAGGCGCTCACC 600	481 GENCGCGGCCTCGAGAACTCGCTTCCGCTCGAGGTCGTCGCGGGGGCCATGACCATCCGC 540	421 GENETECTGAGEACEAGETETGEGGTGTNETECENAEGTEGANTECTTENGEETE 480	361 ACGACTGGTTTCGGCGGCTCGGCCGACACCCGGACTGAGGATGCNATCTCGCTCCAGAAG 420	301 AAGATCGACAANAGNGTCGAGTTCCTCCGNNCNCAGCTCNACAACAGNGTCTACGGNGTC 360	241 TCGGCGCCGCNCGCAAGGGCCGCNCNGTCCGCGTCNCAGACAGNCGACGAGATCCGCGCA 300

PAT

20-APR-2002

```
8
                                                      Ş
                                                                                B
                                                                                                       중 음 성
                                                                                                                                                                                 40
40
                                                                                                                                                                                                                                                              8
                                                                                                                                                                                                                                                                                            B
                                                                                                                                                                                                                                                                                                                 S
                                                                                                                                                                                                                                                                                                                                         В
                                                                                                                                                                                                                                                                                                                                                                   $
                                                                                                                                                                                                                                                                                                                                                                                                뮍
                                                                                                                                                                                                                                                                                                                                                                                                                   S
                                                                                                                                                                                                                                                                                                                                                                                                                                                B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              d
d
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            g
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            SA
PA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Дb
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           фd
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               DЬ
             2401
                                    2341
                                                             2341
                                                                                       2281
                                                                                                                2281
                                                                                                                                        2221
                                                                                                                                                                 2221
                                                                                                                                                                                           2161
                                                                                                                                                                                                                    2161
                                                                                                                                                                                                                                            2101
                                                                                                                                                                                                                                                                     2101
                                                                                                                                                                                                                                                                                               2041
                                                                                                                                                                                                                                                                                                                       2041
                                                                                                                                                                                                                                                                                                                                                 1981
                                                                                                                                                                                                                                                                                                                                                                          1981
                                                                                                                                                                                                                                                                                                                                                                                                    1921
                                                                                                                                                                                                                                                                                                                                                                                                                             1921
                                                                                                                                                                                                                                                                                                                                                                                                                                                       1861
                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1861
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1801
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1801
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1741
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1741
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1681
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1681
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1621
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1501
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1441
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1441
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1381
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1621
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1561
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1561
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1321
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1501
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1381
NNNANAAA
                                                   NGTNINCANNNACNCNTNINNNNANNCNGGNANNGANTNNANGNNTNCGNGNNCNNNNNN
                                                                                                      TINININCTINICTONCININANCINGTONITININININCTININGNITININININCININC
                                                                                                                                          NNNCCNMNNNNNCTNTTNGNNNTCGNNTCNTGNCNMNNNCGGAMNTNNCMNCNNNNNNN
                                                                                                                                                                 NUNCCINININININICTITTINGININTCGINITCHTGINCININININCGGAINTINICINICINININININI
                                                                                                                                                                                                       ACGTCCTCGTCAAGATGCTCGCNTAGNNNCNCNNNCNANNCTCGCNTNNNNNCCNNNCNC
                                                                                                                                                                                                                                                               TGACGATCGGCACCAACGTCTCCCGCATCTACGAGGCCATCAAGNNCGGCNGCATCAACC
                                                                                                                                                                                                                                                                                                TCCGCGAGGAGCTCGGCGTCAAGGCCCGCCGCGGCGACGTCTTCCTCGGCAAGCAGGAGG
                                                                                                                                                                                                                                                                                                               TCCGCGAGGAGCTCGGCGTCAAGGCCCGCCGCCGCCGACGTCTTCCTCGGCAAGCAGGAGG
                                                                                                                                                                                                                                                                                                                                                CGTCGTCGTCGCCGGCGCTCNCGTACCTCTCGCCGCGACGCGCGTCCTGTACTCGTTCG
                                                                                                                                                                                                                                                                                                                                                                 CGTCGTCGTCGCCCGCGCTCNCGTACCTCTCGCCGCGCACGCGCGTCCTGTACTCGTTCG
                                                                                                                                                                                                                                                                                                                                                                                                                CCGCCGAGAAGGCCATCTCGCTCACGCGCNANGTCCGGCGACNCCTTCTGGNCGGCNCCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                    NNGTCCTCGCCNNNNGCCANNAGGTCTCGCTCGCNGCCGTCAACGCCTGGAAGGTCGCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CTCGAGCCGCGCTGGCACGACGCCTTCTCGTTCGCGACCGGCACCGTCGTCGAGNNNNNN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CTCGNGGACAAGGTCAACAAGNCGCTCNACAAGCGNCTCGAGCAGACCAACTCGTACGAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CAGGCCGTCGACCTCCGCGCGATGGAGTTCGAGTTCAAGAAGCAGTTCGACCCGNTNNTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   CAGCCGGCNGAGATGGGCAACCAGGCCGTCAACTCGCTCGCNCTCATCTCGGCNCGCCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 GCCGCNGCNGCNTACACTTCGGAGCTCGGNCACCTTGCCAACCCGGTNACGACCCACGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CONTCCTGCCTCGCTGCCGAGGACCCNTCGCTCTCCTATCACTGCAAGGGCCTCGACATT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        GGCAAGCTCAACTTCACGCAGCTCACCGAGATGCTCAACGCCGGCATGAACCCGCGGCCTN
                                                                                        TINNINCHTNICTONCTONCHINNANCINGTCINTUNINNCTININGNITUNINNINCOININC
                                                                                                                                                                                                                                              TGACGATCGGCACCAACGTCTCCCGCATCTACGAGGCCATCAAGNNCGGCNGCATCAACC
                                                                                                                                                                                                                                                                                                                                                                                                    CCGCCGAGAAGGCCATCTCGCTCACGCGCNANGTCCGCGACNCCTTCTGGNCGGCNCCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                       NNGTCCTCGCCNNNNGCCANNAGGTCTCGCTCGCNGCCGTCAACGCCTGGAAGGTCGCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CTCGAGCCGCGCTGGCACGCCTTCTCGTTCGCGACCGGCACCGTCGTCGAGNNNNNN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CTCGNGGACAAGGTCAACAAGNCGCTCNACAAGCGNCTCGAGCAGACCAACTCGTACGAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CAGGCCGTCGACCTCCGCGCGATGGAGTTCGAGTTCAAGAAGCAGTTCGACCCGNTNNTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                GCCGCNGCNGCNTACACTTCGGAGCTCGGNCACCTTGCCAACCCGGTNACGACCCACGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CCNTCCTGCCTCGCCGAGGACCCNTCGCTCTCCTATCACTGCAAGGGCCTCGACATT
             2408
                                                                                                                                                                                            CGCNTAGNNNCNCNNNCNANNCTCGCNTNNNNNCCNNNCNC
                                                             2400
                                                                                                                                                                2280
                                                                                                                                                                                                                    2220
                                                                                                                                                                                                                                                                                                                                                                                                                             1980
                                                                                                                                                                                                                                                                                                                                                                                                                                                       1920
                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1920
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1860
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1860
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1800
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1800
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1740
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1680
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1620
                                                                                       2340
                                                                                                                                                                                          2220
                                                                                                                                                                                                                                              2160
                                                                                                                                                                                                                                                                   2160
                                                                                                                                                                                                                                                                                               2100
                                                                                                                                                                                                                                                                                                                      2100
                                                                                                                                                                                                                                                                                                                                                2040
                                                                                                                                                                                                                                                                                                                                                                         2040
                                                                                                                                                                                                                                                                                                                                                                                                    1980
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1740
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1680
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1620
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1560
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1560
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1500
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1440
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1440
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1380
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1500
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       REFERENCE
AUTHORS
TITLE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        RESULT 3
AR199605
LOCUS
DEFINITION
ACCESSION
VERSION
VERSION
KEYWORDS
SOURCE
ORGANISM
Ş
                 Дb
                                           δ
                                                                   B
                                                                                           Ş
                                                                                                                         밁
                                                                                                                                              Ş
                                                                                                                                                                            밁
                                                                                                                                                                                                  8
                                                                                                                                                                                                                               В
                                                                                                                                                                                                                                                  Ş
                                                                                                                                                                                                                                                                                 맑
                                                                                                                                                                                                                                                                                                      8
                                                                                                                                                                                                                                                                                                                                  맑
                                                                                                                                                                                                                                                                                                                                                          Š
                                                                                                                                                                                                                                                                                                                                                                                      맑
                                                                                                                                                                                                                                                                                                                                                                                                          Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                         망
                                                                                                                                                                                                                                                                                                                                                                                                                                                               Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          맑
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  JOURNAL FEATURES
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ORIGIN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Query Match
Best Local S
Matches 1913
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      source
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              hes 1913;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     2401
                         577
                                                  601
                                                                        517
                                                                                                  541
                                                                                                                            457
                                                                                                                                                     481
                                                                                                                                                                             397
                                                                                                                                                                                                     421
                                                                                                                                                                                                                                337
                                                                                                                                                                                                                                                       361
                                                                                                                                                                                                                                                                                 277
                                                                                                                                                                                                                                                                                                           301
                                                                                                                                                                                                                                                                                                                                    218
                                                                                                                                                                                                                                                                                                                                                              241
                                                                                                                                                                                                                                                                                                                                                                                      161
  661
                                                                                                                                                                                                                                                                                                                                                                                                               181
                                                                                                                                                                                                                                                                                                                                                                                                                                         101
                                                                                                                                                                                                                                                                                                                                                                                                                                                                  121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               AR199605
Sequence 18
AR199605
AR199605.1
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            سر
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1 ATGGCCCCCTCCNTCGACTCGATCGCGACCTCGNTCGCCAACGGCNTCNCNAACGGNTNG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1 (bases 1 to 2439)
Yoshida,R.K. and Kootstra,A.B.
Phenylalanine ammonia lyase polypeptide and polynucleotide
sequences and methods of obtaining and using same
patent: US 6355468-A 18 12-MAR-2002;
Location/Qualifiers
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Unknown
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Unclassified
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Unknown
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Similarity
                                                                                                                                                                                                                                                                                                                                                                                                            ACCCCACCGNNACGNACGNNNTCGAACTCGACGGGTACACCCTCACCCTCGGNGACGTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                        GCTCGCTCCTCCCGACCACCCAGNNGACGCAGCTCGACATCGTNGAGNAGATCCTCGCCG
                                         AACTTCCTCAACCACGGCATCACCCCCATCGTCCCCCTCCGCGCACCATCTCGGCGTCG
                                                                                          GTCAACTCGCTCACNCGCGGCCACTCGGCNGTCCGCCTCGTCGTCCTCGAGGCGCTCACC
                                                                                                                                          GGNCGCGGCCTCGAGAACTCGCTTCCGCTCGAGGTCGTCCGCGGCGCCCATGACCATCCGC
                                                                                                                                                                                                   GCNCTCCTCGAGCACCAGCTCTGCGGTGTNCTCCCNACGTCGNTCGANTCCTTCNGCCTC
                                                                                                                                                                                                                                                    ACGACTGGTTTCGGCGGCCCGACACCCGGACTGAGGATGCNATCTCGCTCCAGAAG
                                                                                                                                                                                                                                                                                                AAGATCGACAANAGNGTCGAGTTCCTCCGNNCNCAGCTCNACAACAGNGTCTACGGNGTC
GGCGACCTCTCCCCCNCTCTCNTACATCGCCGCCGCCATCACCGGTCACCCGGACNNCAAG
                         AACTTCCTCAACCACGCATCACCCCCATCGTCCCCCTCCGCGCACCATCTCTGCGTCG
                                                                            GICAACAGCTTGACCCGCGGCCACTCGGCTGTCCGCCTCGTCGTCGAGGCGCTCACC
                                                                                                                                                                               GCTCTCCTCGAGCACCAGCTCTGCGGTGTTCTCCCCTTCGTCGTCGACTCGTTCCGCCTC
                                                                                                                                                                                                                             ACGACTGGATTTGGCGGATCCGCAGACACCCGCACCGAGGACGCCATCTCGCTCCAGAAG
                                                                                                                                                                                                                                                                                   AAGATTGACAAATCGGTCGAGTTCTTGCGCTCGCAACTCTCCATGAGCGTCTACGGCGTC
                                                                                                                                                                                                                                                                                                                                     TCTCGGCCGCGAGGAAGGGCAGGCCTGTCCGCGTCAAGGACAG-CGACGAGATCCGCTCA
                                                                                                                                                                                                                                                                                                                                                   TCGGCGCCGCNCGCAAGGGCCGCNCNGTCCGCGTCNCAGACAGNCGACGACGAGATCCGCGCA
                                                                                                                                                                                                                                                                                                                                                                                        CGCCGACCGACTCGA----CGCTCGAACTCGACGGCTACTCGCTCAACCTCGGAGACGTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CAGGCTGT-----GCAGTCGCCGCCTCGACCAACCTC----GCAGTCGCAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   CACGCCGNNCCGNCNNGNCGNCNACGGGCGCCACGTCCACNCTCNGNCGGCCGNCGCNG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             ATGGCACCCTCGCTCGACTCGATCTCGCACTCGTAAACGGCGTCGCATCCGCAAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     NNNANAAA
                                                                                                                             GGCCGCGGTCTCGAGAACTCGCTTCCCCTCGAGGTTGTTCGCGGCGCCATGACAATCCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         18
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          /organism="unknown"
/mol_type="unassigned
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     2408
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    .2439
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         from
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 GI:20249679
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         68.7%;
                                                                                                                                                                                                                                                                                                                                                                                                                                         ccacaaccaaegrcacecaegrceacarcerceaeaaaaaarecrcecee
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       patent
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                0
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Score 1699.4; DB 6;
Pred. No. 5.1e-177;
0; Mismatches 459;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         2439 bp
US 6355468
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              DNA "
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     DNA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       6
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        linear
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Length
```

36;

9

576 600 516 540 456 480 396 420 336 360

720 636 660 276

300 217 240 160 180

```
1537
                                                                                                                                                                                                                                                                                                                                                                                                                            1441
                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1357
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1381
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1297
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1321
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1237
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1261
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1177
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1201
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1117
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1141
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1057
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1081
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1021
                                                                                                                                                                                                                                                                                                         1477
                                                                                                                                                                                                                                                                                                                                            1501
                                                                                                                                                                                                                                                                                                                                                                                    1417
                                                                                                                                              1597
                                                                                                                                                                                    1621
                                                                                                                                                                                                                                                                 1561
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                997
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                937
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           877
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               637
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    196
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   901
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         817
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               841
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    757
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          781
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  697
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       721
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       GGCCCGCTCGTCAGCGACATGATTCACGCCCACGCNGTCCTCTCGCTCGAGGCCCGGNCAG 1200
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             GTNCACGTNNTNCACGAGGGCANNGAGAAGATCATGTNCGCCCGCGAGGCGATCGCGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             GGCGACCTCTCTCTCTCTCTACATTGCAGCGGCCATCAGCGGTCACCCGGACAGCAAG
CTCGNGGACAAGGTCAACAAGNCGCTCNACAAGCGNCTCGAGCAGAACCAACTCGTACGAC
                                                                                                                                                                                                                                                     GCCGCNGCNTACACTTCGGAGCTCGGNCACCTTGCCAACCCGGTNACGACCCACGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      TCGACGACCGACACCCGCTCATCGACGTCGAGAACAAGANGACCCACCACGGCGGCAAC 1260
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             GACGACGAGGGCATTCTCCGCCAGGACCGCTACCCGCTCCGCACGTCGCCTCAGTGGCTC 1140
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CGCACGCTCCTCGAGGCAGCNNGTTTGCCGTCCACCACGAGGAGGAGGAGGTCAAAGGTCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CONTICCTCCACGACGTCACGCGCCCTCACCCGACCCGAGTCGAGGGTCGCGCGCAACATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              TCGCAGTCGCTCACGGCCATGACGGTCGAAGCGATGGTCGGCCACGCCGGCTCGTTCCAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     TCGCAGGCGCTCACGGCTCTNACGGTCGAGGCCATGGTCGGCCACGCCCGGCTCGTTCCAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               TINGGICTCGAGCCCGTCGTCCTCGGCCCGAAGGAGGTCTCGGTCTCGTCAACGGCACG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GTGCACGTCGTCCACGAGGGCAAGGAGAAGATCCTGTACGCCCGCGAGGCGATGGCGCTC
                                                                GICTCGCTCATCGACCAGCACTTTGGCTCCGCCATGACCGGCTCGAACCTGCGCGACGAG 1716
                                                                                                    CAAGCCATCGACTTGCGCGCGATCGAGTTCGAGTTCAAGAAGCAGTTCGGCCCAGCCATC 1656
                                                                                                                                                                                 CAGGCCGTCGACCTCCGCGCGATGGAGTTCGAGTTCAAGAAGCAGTTCGACCCGNTNNTC
                                                                                                                                                                                                                             CAGCCGGCTGAGATGGCGAACCAGGCGGTCAACTCGCTTGCGCTCATCTCGGCTCGTCGC
                                                                                                                                                                                                                                                                                                                                        CAGCCGGCNGAGATGGGCAACCAGGCCGTCAACTCGCTCGCNCTCATCTCGGCNCGCCGC 1560
                                                                                                                                                                                                                                                                                                                                                                                    GCCGCTGCGGCGTACACCTCGGAGTTGGGACACCTCGCCAACCCTGTGACGACGCATGTC 1476
                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CCCTCCTGCCTCGCGGCCGAAGACCCCTCGCTCTCCTACCACTGCAAGGGCCTCGACATC 1416
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CONTCCTGCCTCGCTGCCGAGGACCCNTCGCTCTCCTATCACTGCAAGGGCCTCGACATT 1440
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 GGCAAGCTCAACTTCACGCAGCTCACCGAGATGCTCAACGCCGGCATGAACCGCGGCCTC. 1356
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       GGCAAGCTCAACTTCACGCAGCTCACCGAGATGCTCAACGCCGGCATGAACCGCGGCCTN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               TTCCAGGCTGCCGCTGTGGCCAACACCATGGAGAAGACTCGCCTCGGGCTCGCCCAGATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            TCGACGACCGACAACCCTCTCATCGACGTCGAGAACAAGACTTCGCACCACGGCGCAAT 1236
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          GACGACGAGGGCATTCTCCGCCAGGACCGCTACCCCTTGCGCACGTCTCCTCAGTGGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   CGCAAGCTCCTCGAGGGAAGCCGCTTTGCTGTCCACCATGAGGAGGAGGTCAAGGTCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CCCTTCCTTCACGACGTCACGCGCCCTCACCCGACGCAGATCGAAGTCGCGGGAAACATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       GCCGTCTCAGCATCGATGGCCACCCTCGCTCTGCACGACGCACACATGCTCTCGCTCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      TTCAACCTCGAGCCCGTCGTCCTCGGCCCGAAGGAAGGTCTCGGTCTCGTCAACGGCACC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1380
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1320
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1176
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1116
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1080
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              936
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1056
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1020
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   960
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           876
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               900
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            840
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            780
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 696
                                                                                                        1740
                                                                                                                                                                                                                                                                                                         1536
                                                                                                                                                                                                                                                                                                                                                                                                                              1500
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                996
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      816
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    756
                                                                                                                                                                                      1680
                                                                                                                                                                                                                             1596
```

Ş 멂 Š B Ś B Ś 밁 Ś 밁 5 밁

당

Ş 멍 8 片 8 밁 Ş 밁 Ş 밁 8 밁 8

Š B,

S

S B Ś 밁

1741

1800

S

B

뮍

```
RESULT 4
AX366866
LOCUS
DEFINITION
ACCESSION
                                                                                                                                                                                                                                                                                                                                                                     REFERENCE
AUTHORS
TITLE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        SOURCE
ORGANISM
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 VERSION
KEYWORDS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ď.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               뭐
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           뮹
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              망
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                  FEATURES
                                                                                                                                                                                                                                                                                                               JOURNAL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             2365
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       2401
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    2305
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                2341
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          2246
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   2281
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                2186
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         2221
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            2161
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         2066
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  2101
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               2006
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        2041
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1946
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1981
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1886
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1921
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1837
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1861
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1777
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1717
                                                                                                                                                                                                                                            Phenylalanine ammonia lyase polypeptide and polynucleotide
sequences and methods of obtaining and using same
Patent: WO 0208402-A 18 31-JAN-2002;
PCBU Services, Inc. (US)
Location/Qualifiers
                                                                                                                                                                                                                                                                                                                                                                                                                                                     Rhodosporidium toruloides
Rhodosporidium toruloides
Bukaryota; Fungi; Basidiomycota; Urediniomycetes;
Microbotryomycetidae; Sporidiobolales; Rhodosporidium.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              AX366866 2439 bp
Sequence 18 from Patent WOO208402.
AX366866
AX366866.1 GI:18698155
                                                                                                                                                                                                                                                                                                                                                                                                     Yoshida, R.K. and Kootstra, A.B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         NNIOCONNINININOCTITTINGNINITCGINITCHTGINCHNININININICGGANITINICHNICHNINININI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        NNGTCCTCGCCNNNNGCCANNAGGTCTCGCTCGCNGCCGTCAACGCCTGGAAGGTCGCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CTCGAGCCGCGCTGGCACGACGCCTTCTCGTTCGCGACCCGGCACCGTCGTCGAGNNNNNN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CTCGTCGAGAAGGTGAACAAGACGCTCGCCAAGCGCCTCGAGCAGACCAACTCGTACGAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       NNNANAAA 2408
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             TCGTTCTTGGCTGCCTCTC-TAGACCGTGTCCGTATTACCTCGAGATTGTGAATACAAGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             TATCCCGCCTGCACTCTTAGGACTCGCTTCTTGTCGGACTCGGATCTCGCATCGCTTCTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         ACGTCCTCGTCAAGATGCTCGCNTAGNNNCNCNNNCNANNCTCGCNTNNNNNCCNNNCNC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         TGACGATCGGCACCAACGTCTCCCGCATCTACGAGGCCATCAAGNNCGGCNGCATCAACCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               TCCGCGAGGAGCTCGGCGTCAAGGCCCGCCGCGGCGACGTCTTCCTCGGCAAGCAGGAGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     cgregregregeecegegerenegracereregeegegegaegegegereergraceregereer
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 CCGCCGAGAAGGCCATCTCGCTCACGCGCNANGTCCGCGACNCCTTCTGGNCGGCNCCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              TCGTCGACGTC----
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    credreceded de de carecer de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra 
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             CGCATAAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             NGTININCAMMACNCHTNININININAMICNGGNAMIGANTINIANGNNTNCGNGNNCHNINININ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         TGACGATCGGCTCGAACGTCTCCAAGATCTACGAGGCCATCAAGTCGGGCAGGATCAACA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     ceacercercececececiereceracercreececececacreaearecreracecerree
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        ccecceaenceeccarcicecicacceccaaenceeceaeaccincieenceecece
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    AGTACCCATCCACGCATCCGATAAATCAGGGAGAAATCTACGCTTGCGGGAGCTTCTTG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                THUNNICHTUNCTIONCTIONINNANCHINGTONTHUNINGTHUNIGHTHUNINNINCHINIC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ACGTCCTCAAGATGCTCGCTTAGACACTCTTCCCACTCTCGCATCCCTTCCATACCC
                                                                                                            /organism="Rhodosporidium toruloides"
/mol_type="unassigned DNA"
/db_xref="taxon:5286"
/note="unnamed protein product"
/codon_start=1
/protein_id="CAD23831.1"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             2372
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           DNA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 linear
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 PAT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 15-FEB-2002
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     2160
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1945
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1980
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1920
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1836
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            2280
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   2220
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  2065
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               2100
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     2005
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  2040
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   2400
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          2340
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         2185
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            2125
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             2304
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      2245
```

816

```
δ.
                                                            8
8
8
                                                                                                                                               85 B 85
                                                                                                                                                                                                                               δ
                                                                                                                                                                                                                                                                                                                                                       B
                                                                                                                                                                                                                                                                                                                                                                            Ś
                                                                                                                                                                                                                                                                                                                                                                                                         Вb
                                                                                                                                                                                                                                                                                                                                                                                                                                      Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                              В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ϋ́
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Дb
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               당
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Best Local Similarity
Matches 1913; Conserv
               697
                                     721
                                                                    637
                                                                                                199
                                                                                                                            577
                                                                                                                                                                                  517
                                                                                                                                                                                                                                          457
                                                                                                                                                       109
                                                                                                                                                                                                               541
                                                                                                                                                                                                                                                                     481
                                                                                                                                                                                                                                                                                                  397
                                                                                                                                                                                                                                                                                                                            421
                                                                                                                                                                                                                                                                                                                                                          337
                                                                                                                                                                                                                                                                                                                                                                                                                  277
                                                                                                                                                                                                                                                                                                                                                                                     361
                                                                                                                                                                                                                                                                                                                                                                                                                                             301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                          218
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  161
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        101
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  ب
                              GTNCACGTNNTNCACGAGGGCANNGAGAAGATCATGTNCGCCCGCGAGGCGATCGCGCTC
                                                                                    GGCGACCTCTCCCCCCCTCTCNTACATCGCCGCCCCATCACCGGTCACCCGGACNNCAAG
                                                                                                                                                                                                                                                                                                                                                                                                               GTGCACGTCGTCCACGAGGGCAAGGAGAAGATCCTGTACGCCCGCGAGGCGATGGCGCTC
                                                                     GGCGACCTCTCTCTCTCTACATTGCAGCGGCCATCAGCGGTCACCCGGACAGCAAG
                                                                                                                             AACTTCCTCAACCACGGCATCACCCCCATCGTCCCCCTCCGCGGCACCATCTCTGCGTCG
                                                                                                                                           AACTTCCTCAACCACGGCATCACCCCCATCGTCCCCCTCCGCCGCACCATCTCGGCGTCG
                                                                                                                                                                                    GTCAACAGCTTGACCCGCGCCACTCGGCTGTCCGCCTCGTCCTCGAGGCGCTCACC
                                                                                                                                                                                                               GTCAACTCGCTCACNCGCGGCCACTCGGCNGTCCGCCTCGTCGTCCTCGAGGCGCTCACC
                                                                                                                                                                                                                                         GECCECEGTCTCGAGAACTCECTTCCCCTCGAGGTTGTTCECGEGCECATGACAATCCEC
                                                                                                                                                                                                                                                         GCTCTCCTCGAGCACCAGCTCTGCGGTGTTCTCCCTTCGTCGTTCGACTCGTTCCGCCTC
                                                                                                                                                                                                                                                                                                                ACGACTGGTTTCGGCGGCTCGGCCGACACCCCGGACTGAGGATGCNATCTCGCTCCAGAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         TCGGCGCCGCNCGCAAGGGCCGCNCNGTCCGCGTCNCAGACAGNCGACGAGATCCGCGCA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CGCCGACCGACTCGA---
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ACCCCACCGNNACGNACGNNNTCGAACTCGACGGGTACACCCTCACCCTCGGNGACGTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           GCTCGCTCCCCGACCACCAGNNGACGCAGCTCGACATCGTNGAGNAGATCCTCGCCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CAGGCTGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CACGCCGNNCCGNCNNGNCGNCNACGGGCGCCACGTCCACNCTCNGNCGGCCGNCGCNG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      ATGGCCCCCCCCCCAACGGACCTCGATCGCGAACCTCGNTCGCCAACGGCNTCNCNAACGGNTNG
                                                                                                                                                                                                                                                                                                                                                        ACGACTGGATTTGGCGGATCCGCAGACACCCGCGCACGGACGCCATCTCGCTCCAGAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                        TCTCGGCCGCGAGGAAGGGCAGGCCTGTCCGCGTCAAGGACAG-CGACGAGATCCGCTCA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        GCTCGCACCTGCCCACACCCAGGTCACGCAGGTCGACATCGTCGAGAAGATGCTCGCCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ATGGCACCCTCGCTCGACTCGATCTCGCACTCGCAAACGGCGTCGCATCCGCAAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              /db_xref="GI:18698156"
/db_xref="GI:18698156"
/db_xref="REMTREMBL:CAD23831"
/translation="MAPSLDSISHSFANGVASAKQAVNGASTNLAVAGSHLPTTQVTQ
/translation="MAPSLDSISHSFANGVASAKRGRYNVKNSDEIRSKIDKSVEEUR
VDIVEXMLAAPTDSTIELDGYSLANGDVVSAARKGRPYNVKNSDEIRSKIDKSVEEUR
SQLEMSVYGVTTGFGGSADTRTEDAISLQKALLEHQLCGVLPSSFDSFRLGRGLENSL
PLEVVRGAMTIR VNG1TRGHSAVKLVVLEALTNFLNHG1TP1VLFCTISASGDLSFL
SYIAAAISGHEDSKYHVYHEGKEKILYAREAMALFHLEPVLLGPKEGLLINGTAVSA
SMATILALHDAHMLSLLSQSLTAMTVEAMVGHAGSFHPFLHDVTRPHPTQIEVAGNIRK
LLEGSRFAVHHEEEVKYKDDEGILRQDRYPLRTSPQWLGPLVSDLIHAHAVLTIEAGQ
STTNNPLIDVEKKTSHGGNGAAAVATTSELGHLANFVTTHVQPAEMANQAVNSLALI
SGLPSCLAAEDPSLSYHCKGLDIAAAAYTSELGHLANFVTTHVQPAEMANQAVNSLALI
SARRTTESNUVLSLILLATHLYCYLQAIDLAALEFEFKKQFGPAIVSLIDGHFGSANTG
SNLRDELVEKVNKTLAKRLEQTNSYDLVFRHDAFSFAAGTVVEVLSSTSLSLAAVNA
MKVAAAASAISLTRGVRETTWSAASTSSPALSYLSPRTQILYAFVREELGVKARRGDV
FLGKQEVTIGSNVSKIYEAIKSGRINNVLLKYLA"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         68.7%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               -CGCTCGAACTCGACGGCTACTCGCTCAACCTCGGAGACGTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                ----CAATGGCGCCTCGACCAACCTC----
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             0
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Score 1699.4; DB 6;
Pred. No. 5.1e-177;
0; Mismatches 459;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             36;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               GCAGTCGCAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Gaps
                                        780
                                                                                               720
                                                                                                                            636
                                                                                                                                                       660
                                                                                                                                                                                    576
                                                                                                                                                                                                             600
                                                                                                                                                                                                                                                                  540
                                                                                                                                                                                                                                                                                                456
                                                                                                                                                                                                                                                                                                                            480
                                                                                                                                                                                                                                                                                                                                                                                    420
                                                                     696
                                                                                                                                                                                                                                          516
                                                                                                                                                                                                                                                                                                                                                        396
                                                                                                                                                                                                                                                                                                                                                                                                                336
                                                                                                                                                                                                                                                                                                                                                                                                                                          360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                       276
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                217
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       160
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  180
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               100
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         120
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             6
                   ₽
                                                δ
                                                                                 밁
                                                                                                     Š
                                                                                                                                   밁
                                                                                                                                                           δ
                                                                                                                                                                                        밁
                                                                                                                                                                                                                   δ
                                                                                                                                                                                                                                                      멍
                                                                                                                                                                                                                                                                           δ
                                                                                                                                                                                                                                                                                                             В
                                                                                                                                                                                                                                                                                                                                      Š
                                                                                                                                                                                                                                                                                                                                                                      맑
                                                                                                                                                                                                                                                                                                                                                                                          δ
                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                             B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             占
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         당
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                멍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     뮹
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        뭥
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             8
                                                                                                                                                                                                                                                                                                                                                                      1417
                           1777
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1177
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1141
                                                                                                            1741
                                                                                                                                                                                              1597
                                                                                                                                                                                                                           1621
                                                                                                                                                                                                                                                      1537
                                                                                                                                                                                                                                                                                   1561
                                                                                                                                                                                                                                                                                                                1477
                                                                                                                                                                                                                                                                                                                                           1501
                                                                                                                                                                                                                                                                                                                                                                                                 1441
                                                                                                                                                                                                                                                                                                                                                                                                                                1357
                                                                                                                                                                                                                                                                                                                                                                                                                                                         1381
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1297
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1321
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1237
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1261
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1117
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1057
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1081
1861
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1021
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           997
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 937
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             961
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         877
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     901
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             841
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         757
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     781
NNGTCCTCGCCNNNNGCCANNAGGTCTCGCTCGCNGCCGTCAACGCCTGGAAGGTCGCCT
                                                                                                         CTCGNGGACAAGGTCAACAAGNCGCTCNACAAGCGNCTCGAGCAGACCAACTCGTACGAC
                                                                                                                                                           GGCCCGCTCGTCAGCGACATGATTCACGCCCACGCNGTCCTCTCGCTCGAGGCCGGNCAG
                           CTCGTCCCGCGCTGGCACGACGCCTTCTCCTTCGCCGCCGGCACCGTCGTCGAGGTCCTC
                                          CTCGAGCCGCGCTGGCACGACGCCTTCTCGTTCGCGACCGGCACCGTCGTCGAGNNNNNN
                                                                                   CTCGTCGAGAAGGTGAACAAGACGCTCGCCAAGCGCCTCGAGCAGCCAACTCGTACGAC
                                                                                                                                         GTCTCGCTCATCGACCAGCACTTTGGCTCCGCCATGACCGGCTCGAACCTGCGCGACGAG
                                                                                                                                                                                                CAAGCCATCGACTTGCGCGCGATCGAGTTCGAGTTCAAGAAGCAGTTCGGCCCAGCCATC
                                                                                                                                                                                                                  CAGGCCGTCGACCTCCGCGCGATGGAGTTCGAGTTCAAGAAGCAGTTCGACCCGNTNNTC
                                                                                                                                                                                                                                                        CAGCCGGCTGAGATGGCGAACCAGGCGGTCAACTCGCCTTGCGCTCATCTCGGCTCGTCGC
                                                                                                                                                                                                                                                                                                                            CAGCCGGCNGAGATGGGCAACCAGGCCGTCAACTCGCTCGCNCTCATCTCGGCNCGCCGC
                                                                                                                                                                                                                                                                                                                                                                        GCCGCTGCGGCGTACACCTCGGAGTTGGGGACACCTCGCCAACCCTGTGACGACGCATGTC
                                                                                                                                                                                                                                                                                                                                                                                                GCCGCNGCNGCNTACACTTCGGAGCTCGGNCACCTTGCCAACCCGGTNACGACCCACGTC
                                                                                                                                                                                                                                                                                                                                                                                                                              CCCTCCTGCCTCGCGGCCGAAGACCCCCTCGCTACCACTGCAAGGGCCTCGACATC
                                                                                                                                                                                                                                                                                                                                                                                                                                               CCNTCCTGCCTGCCGAGGACCCNTCGCTCTCCTATCACTGCAAGGGCCTCGACATT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      GGCAAGCTCAACTTCACGCAGCTCACCGAGATGCTCAACGCCGGCATGAACCGCGGCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GGCAAGCTCAACCTTCACGCAGCTCACCGAGATGCTCAACGCCGGCATGAACCGCCGGCCTN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               TCGACGGACCGACACCCGCTCATCGACGTCGAGAACAAGANGACCCACCACGACGACGCAAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 GACGACGAGGGCATTCTCCGCCAGGACCGCTACCCCTTGCGCACGTCTCCTCAGTGGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          GACGACGAGGGCATTCTCCGCCAGGACCGCTACCCGCTCCGCACGTCGCCTCAGTGGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CGCACGCTCCTCGAGGGCAGCNNGTTTGCCGTCCACCACGAGGAGGAGGAGGTCAAGGTCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CCNTTCCTCCACGACGTCACGCGCCCTCACCCGACCCAGATCGAGGTCGCGCGCAACATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        TCGCAGGCCCCACGCCTCTNACGGTCGAGGCCATGGTCGGCCACGCCAGGCCGGCTCGTTCCAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    GCCGTCTCCGCTCGATGGCGACCCTCGCTCTGCACGACGCACACATGCTCTCCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      TINGGTCTCGAGCCCGTCGTCCTCGGCCCGAAGGAGGTCTCGGTCTCGTCAACGGCACG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              TTCCAGGCTGCCGCTGTGGCCAACACCATGGAGAAGACTCGCCTCGGGCTCGCCCAGATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    TCGACGACCAACCCTCTCATCGACGTCGAGAACAAGACTTCGCACCACGGCGGCAAT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CGCAAGCTCCTCGAGGGAAGCCGCTTTGCTGTCCACCATGAGGAGGAGGTCAAGGTCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 CCCTTCCTTCACGACGTCACGCGCCCTCACCCGACGCAGATCGAAGTCGCGGGAAACATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         TCGCAGTCGCTCACGGCCATGACGGTCGAAGCGATGGTCGGCCACGCCGGCTCGTTCCAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 GCCGTCTCAGCATCGATGGCCACCCTCGCTCTGCACGACGCACACATGCTCTCGCTCCTC
                                                       1860
                                                                                                                                         1716
                                                                                                                                                                    1740
                                                                                                                                                                                                1656
                                                                                                                                                                                                                                                                                                                                                                                                                              1416
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1356
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1320
                                                                                                              1800
                                                                                                                                                                                                                            1680
                                                                                                                                                                                                                                                        1596
                                                                                                                                                                                                                                                                                   1620
                                                                                                                                                                                                                                                                                                                1536
                                                                                                                                                                                                                                                                                                                                           1560
                                                                                                                                                                                                                                                                                                                                                                        1476
                                                                                                                                                                                                                                                                                                                                                                                                 1500
                                                                                                                                                                                                                                                                                                                                                                                                                                                         1440
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1380
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1296
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1236
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1260
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1176
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1200
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1140
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1056
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1080
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1020
```

```
RESULT 5
E01783
LOCUS
DEFINITION
ACCESSION
VERSION
KEYWORDS
SOURCE
ORGANISM
                                                                                                                                                                                                    REFERENCE
AUTHORS
TITLE
                                                                                                                                                                                                                                                                                                                                                                        Z,
                                                                                                                                                                                                                                                                                                                                                                                               Ś
                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                        Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                               B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            δÃ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  g
                                                                                                                                                            COMMENT
                                                                                                                                                                               JOURNAL
                                                                            TILE RECOMBINANT PLASMID FOR MANIFESTING L-PHENYLALANINE-AMMONIA-LYASE AND TRANSFORMANT CONTAINING SAID PLASMID PATENT: JP 1988317086-A 1 26-DEC-1988;

NT OS Rhodosporidium toruloides
PN JP 1988317086-A/1
PD 26-DEC-1988
PP 18-JUN-1987 JP 1987152357
PI FUKUHARA NOBUHIRO, YOSHINO SADAO, WATANABE MIDOPT
PC C12NIK/^^
PC C12NIK/^^
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1886
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1837
                                                                                                                                                                                                                                                                                                                                                                                                 2401
                                                                                                                                                                                                                                                                                                                                                                                                                     2305
                                                                                                                                                                                                                                                                                                                                                                                                                                          2341
                                                                                                                                                                                                                                                                                                                                                                                                                                                                2246
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    2281
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          2186
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               2221
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        2161
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              2066
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 2101
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       2006
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            2041
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1946
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1981
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1921
                                                                                                                                                                                                                                                                                                                                                                            365 CGCATAAA 2372
                                                                                                                                                                                                                                                                                                 E01783.1 GI:2170036
                                                                                                                                                                                                                                                         Rhodosporidium toruloides Rhodosporidium toruloides
유유유유유표표
                                                                                                                                                                                                                                                                               JP 1988317086-A/1.
                                                                         C12R1:01);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             NINCCNNNNNNNCTNTTNGNNNTCGNNTCNTGNCNNNNNCGGANNTNNCNNCNNNNNNN
                                                                                                                                                                                                                                                                                                                                                                                                 NNNANAAA 2408
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          TATECCGCCTGCACTCTTAGGACTCGCTTCTTGTCGGACTCGGATCTCGCATCGCTTCTT 2245
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        TCCGCGAGGAGCTCGGCGTCAAGGCCCGCCGCGGCGACGTCTTCCTCGGCAAGCAGGAGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     cercercercecececronceraccrcrcececececececercraracrcerre
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               CCGCCGAGAAGGCCATCTCGCTCACGCGCNANGTCCGCGACNCCTTCTGGNCGGCNCCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     TCGTCGACGTC-
                                                                                                                                                                                                                                                                                                                                                                                                                      AGTACCCATCCACGCATCCGATAAATCAGGGAGAGAATCTACGCTTGCGGGAGCTTCTTG 2364
                                                                                                                                                                                                                                                                                                                                                                                                                                         NGTNINICANNIACNCNTNINININIANNCNGGNAMNGANTINIANGNINTNCGNGMNCHINININ 2400
                                                                                                                                                                                                                                                                                                                                                                                                                                                                TCGTTCTTGGCTGCCTCTC-TAGACCGTGTCCGTATTACCTCGAGATTGTGAATACAAGC 2304
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    THINNICHTNICTCNCCONNINANCHIGTCNNTHINNINCTNNINGHNTHINNINNINCHINIC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        ACGTCCTCGTCAAGATGCTCGCNTAGNNNCNCNNNCNANNCTCGCNTNNNNNCCNNNCNC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              TGACGATCGGCTCGAACGTCTCCAAGATCTACGAGGCCATCAAGTCGGGCAGGATCAACA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CGACCTCGTCGCCCGCGCTCTCGTACCTCTCGCCGCGCACTCAGATCCTCTACGCCTTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CCGCCGAGTCGGCCATCTCGCTCACCCGCCCAAGTCCGCGAGACCTTCTGGTCCGCCGCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ACGTCCTCCAAGATGCTCGCTTAGACACTCTTCCCACTCTCGCATCCCTTCCATACCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 TGACGATCGGCACCAACGTCTCCCGCATCTACGAGGCCATCAAGNNCGGCNGCATCAACC
                             topology: Linear;
hypothetical: No;
anti-sense: No;
                                                             strandedness: Double;
         *source: strain=IFO 559 (ATCC 10788);
Key Location/Qualifiers
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   GCTCTCGCTCGCCGCCGTCAACGCCTGGAAGGTCGCCG
                                                                                                                                                                                                                                                                                                                         PAT 29-SEP-1997
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                2280
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         2220
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   2160
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      2040
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1945
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1980
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1885
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      2340
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              2125
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         2065
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            2100
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  2005
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     2185
                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                   Ś
                                                                                                                                                                                                                                                                                                                                                                                        B
                                                                                                                                                                                                                                                                                                                                                                                                          Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                 돥
                                                                                                                                                                                                                                                                                                                                                                                                                                                    Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                           B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 FEATURES
                                                                                                                             밁
                                                                                                                                                 Ś
                                                                                                                                                                         밁
                                                                                                                                                                                          Š
                                                                                                                                                                                                                 맑
                                                                                                                                                                                                                                    Š
                                                                                                                                                                                                                                                          В
                                                                                                                                                                                                                                                                               Ś
                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                      Š
                  8
                                                             8
                                                                                   В
                                                                                                      Ş
                                           В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Query Match
Best Local 9
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       source
                                                                                                                                                                                                                                                                                                                                                                                                              301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      101
                                                                                                                                                                                                                                                             457
                                                                                                                                                                                                                                                                                 481
                                                                                                                                                                                                                                                                                                       397
                                                                                                                                                                                                                                                                                                                                               337
                                                                                                                                                                                                                                                                                                                                                                    361
                                                                                                                                                                                                                                                                                                                                                                                                                                  218
                                                                                                                                                                                                                                                                                                                                                                                                                                                                            161
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           121
  817
                                                                                      697
                                                                                                         721
                                                                                                                                637
                                                                                                                                                   661
                                                                                                                                                                         577
                                                                                                                                                                                             601
                                                                                                                                                                                                                   517
                                                                                                                                                                                                                                       541
                                                                                                                                                                                                                                                                                                                          421
                                                                                                                                                                                                                                                                                                                                                                                        277
                                                                                                                                                                                                                                                                                                                                                                                                                                                        241
                                            757
                                                                781
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                13
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          \vdash
```

```
Matches 1891;
             841
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1 ATGGCCCCCTCCNTCGACTCGATCGCGACCTCGNTCGCCAACGGCNTCNCNAACGGNTNG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      3'UTR
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Similarity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            AAGATCGACAANAGNGTCGAGTTCCTCCGNNCNCAGCTCNACAACAGNGTCTACGGNGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CGCCGACCGACTCGA----CGCTCGAACTCGACGCTACTCGCTCAACCTCGGAGACGTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ACCCCACCGNNACGNACGNNNTCGAACTCGACCGGTACACCCTCACCCTCGGNGACGTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 geregerecerecea, en a conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva del la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de la conserva de l
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             CACGCCGNNCCGNCNNGNCGNCNACGGGCGCCACGTCCACNCTCNGNCGGCCGNCGCNG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   TCTCGGCCGCGAGGAAGGGCAGGCCTGTCCGCGTCAAGGACAG-CGACGAGATCCGCTCA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      GCTCGCACCTGCCCACAACCCAAGGTCACGCAGGTCGACATCGTCGAGAAGATGCTCGCCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CAGGCTGT-----GCAGTCGCCGCCTCGACCACCTC----GCAGTCGCAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ATGGCACCCTCGACTCGATCTCGCACTCGTTCGCAAACGGCGTCGCATCCGCAAAG
GGCGACCTCTCCCCCCTCTCCTACATCGCCGCCGCCATCACCGGTCACCCGGACNNCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               GENCECEGECTCGAGAACTCGCTTCCGCTCGAGGTCGTCCGCGGGGGCCATGACCATCCGC 540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       cerereción de accidente de contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la con
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                GCNCTCCTCGAGCACCAGCTCTGCGGTGTNCTCCCNACGTCGNTCGANTCCTTCNGCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                ACGACTGGTTTCGGCGGCTCGGCCGACACCCGGGACTGAGGATGCNATCTCGCTCCAGAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        TCGGCGCCGCNCGCAAGGGCCGCNCNGTCCGCGTCNCAGACAGNCGACGAGATCCGCGCA
                                                                                                                                                                                                                                       TINGGTCTCGAGCCCGTCGTCCTCCGCCCGAAGGAGGGTCTCGGTCTCGTCAACGGCACG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            GTNCACGTNNTNCACGAGGGCANNGAGAAGATCATGTNCGCCCGCGAGGCGATCGCGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              AACTTCCTCAACCACGGCATCACCCCCATCGTCCCCCTCCGCGCACCATCTCGGCGTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           GCCGCGGTCTCGAGAACTCGCTTCCCCTCGAGGTTGTTCGCGGCGCGTCATGACAATCCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         <u>AAGATTGACAAATCGGTCGAGTTCTTGCGCTCGCAACTCTCCATGAGCGTCTACGGCGTC</u>
                                                                                                                                                     TTCAACCTCGAGCCCGTCGTCCGCCCCGAAGGAAGGTCTCGGTCAACGGCACC
                                                                                                                                                                                                                                                                                                                                                                                                                 GTGCACGTCCACGAGGGCAAGGAGAAGATCCTGTACGCCCGCGAGGCGATGGCGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GGCGACCTCTCTCTCTCTACATTGCAGCGGCCATCAGCGGTCACCCGGACAGCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          AACTTCCTCAACCACGCATCACCCCCATCGTCCCCCTCCGCGCACCATCTCTGCGTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               greakeascrisacecssescacies series eccicsics recies de des concercas en concerca es en concerca es en concerca e
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            ACGACTGGATTTGGCGGATCCGCAGACACCCGCACGGAGGACGCCATCTCGCTCCAGAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 CDS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         /organism="Rhodosporidium toruloides"
/mol_type="genomic DNA"
/db_xref="taxon:5286"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Location/Qualifiers
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 67.8%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             2152.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      /product='L-phenylalanine ammonialyase'
. .2331.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    0;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Score 1677.4; DB 6;
Pred. No. 1.3e-174;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Mismatches 425;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   2331
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 36;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 FΤ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              180
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                100
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          120
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          396
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      336
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  276
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          160
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             60
                                                                                                                                                                          816
                                                                                                                                                                                                                                                                                                    840
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          780
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       636
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             576
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       600
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                516
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     456
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        217
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         240
                                                                                                                                                                                                                                                                                                                                                                                                                                      756
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           696
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  660
```

decerrencia de la redecencia de la contra de la comparción de la contra del la contra del la

유 성

```
1777
                                                                                              1921
                                                                                                                                                                                                                                                                                                                                                                                              1717
                                                                                                                                                                                                                                                                                                                                                                                                                                                      1741
                                         1886
                                                                                                                                                          1837
                                                                                                                                                                                                                   1861
                                                                                                                                                                                                                                                                                                                                     1801
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1657
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1681
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1597
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1621
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1537
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1561
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1477
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1501
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1417
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1441
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1357
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1381
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1297
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1321
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1237
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1261
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1177
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1201
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1117
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1141
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1057
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1081
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1021
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              997
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                937
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           196
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       877
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             901
                                                                           CTCGAGCCGCGCTGGCACGACGCCTTCTCGTTCGCGACCCGGCACCGTCGTCGAGNNNNNN
                                                                                                                                                                                                                                                                                                                                                                                                                          GTCTCGCTCATCGACCAGCACTTTGGCTCCGCCATGACCGGCTCGAACCTGCGCGACGAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  ccecceaerceeccarcreecreacceecaaerceecaaeaccrrereerceececer
                                                                                                                                                          TCGTCGACGTC
                                                                                                                                                                                                                NNGTCCTCGCCNNNNGCCANNAGGTCTCGCTCGCNGCCGTCAACGCCTGGAAGGTCGCCT
                                                                                                                                                                                                                                                                         CTCGTCCCGCGCTGGCACGACGCCTTCTCCTTCGCCGCCGCCACCGTCGTCGAGGTCCTC
                                                                                                                                                                                                                                                                                                                                                                                          CTCGTCGAGAAGGTGAACAAGACGCTCGCCAAGCGCCTCGAGCAGACCAACTCGTACGAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CAGGCCGTCGACCTCCGCGCGATGGAGTTCGAGTTCAAGAAGCAGTTCGACCCGNTNNTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CAGCCGGCNGAGATGGGCAACCAGGCCGTCAACTCGCTCGCNCTCATCTCGGCNCGCCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               GCCGCTGCGGCGTACACCTCGGAGTTGGGACACCTCGCCAACCCTGTGACGACGCATGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CCNTCCTGCCTGCCGAGGACCCNTCGCTCTCTCTATCACTGCAAGGGCCTCGACATT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        GGCAAGCTCAACCTTCACGCAGCTCACCGAGATGCTCAACGCCGGGCATGAACCGCCGGCCTN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 GGCCCGCTCGTCAGCGACATGATTCACGCCCACGCNGTCCTCTCGCCTCGAGGCCGGNCAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CAAGCCATCGACTTGCGCGCGATCGAGTTCGAGTTCAAGAAGCAGTTCGGCCCAGCCATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         ACGACCGAGTCCAACGACGTCCTTTCTCTCCTCCTCGCCACCTCTACTGCGTTCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CAGCCGGCTGAGATGGCGAACCAGGCGGTCAACTCGCTTGCGCTCATCTCGGCTCGTCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GCCGCNGCNGCNTACACTTCGGAGCTCGGNCACCTTGCCAACCCGGTNACGACCCACGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 CCCTCCTGCCTCGCGGCCGAAGACCCCTCGCTCCTCCTACCACTGCAAGGGCCTCGACATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      GGCAAGCTCAACTTCACGCAGCTCACCGAGATGCTCAACGCCGGCATGAACCGCGGCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           TTCCAGGCTGCCGCTGTGGCCAACACCATGGAGAAGACTCGCCTCGGGCTCGCCCAGATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   GACGACGAGGGCATTCTCCGCCAGGACCGCTACCCCTTGCGCACGTCTCCTCAGTGGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GACGACGAGGGCATTCTCCGCCAGGACCGCTACCCGCTCCGCACGTCGCCTCAGTGGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CGCAAGCTCCTCGAGGGAAGCCGCTTTGCTGTCCACCATGAGGAGGAGGTCAAGGTCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CGCACGCTCCTCGAGGGCAGCNNGTTTGCCGTCCACCACGAGGAGGAGGTCAAGGTCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CCTTCCTTCACGACGTCACGCGCCCTCACCCGACGCAGATCGAAGTCGCGGGAAACATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CONTICCTCCACGACGICACGCGCCCTCACCCGACCCAGAICGAGGICGCGCGCGAACAIC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                TCGACGACCGACAACCCTCTCATCGACGTCGAGAACAAGACTTCGCACCACGGCGGCAAT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        TCGACGACCGACAACCCGCTCATCGACGTCGAGAACAAGANGACCCACCACGACGGCGAAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 redeadredereacide en accidencia de la redecida de la redecida en como en redecida en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en como en c
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       TCGCAGGCGCTCACGGCTCTNACGGTCGAGGCCATGGTCGGCCACGCCCGGCTCGTTCCAC
                                                                                                                                                       -GCTCTCGCTCGCCGCCGTCAACGCCTGGAAGGTCGCCG
                                                                                           1980
                                  1945
                                                                                                                                                    1885
                                                                                                                                                                                                                                                                         1836
                                                                                                                                                                                                                                                                                                                                                                                          1776
                                                                                                                                                                                                                                                                                                                                                                                                                                                      1800
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1680
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1596
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1620
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1536
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1560
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1476
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1500
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1416
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1440
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1356
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1380
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1296
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1320
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1236
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1260
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1656
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1200
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1116
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1176
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1140
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1056
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1080
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1020
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            996
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 936
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          960
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                REFERENCE
AUTHORS
TITLE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       RESULT 6
E01784
LOCUS
DEFINITION
ACCESSION
                                                                                                                       ORIGIN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           VERSION
KEYWORDS
                                                                                                                                                                                                                                                                         FEATURES
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 SOURCE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       뭕
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       맑
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      멼
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Š
Query Match
Best Local Similarity 80.
Matches 1891; Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       JOURNAL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        ORGANISM
                                                                                                                                                                                                                                            source
                                                                                                                                                                                                                                                                                     CE 1 (bases 1 to 2331)

RS FURUHAREA, N., YOSHINO, S., WATANADE, M., NAKAJIMA, Y. and MAKIGUCHI, N. FORNTROL OF ADVENTITIOUS GENE MANIFESTATION AND PRODUCTION OF ADVENTITIOUS GENE PRODUCT USING SAID CONTROL

PATENET JP 1988317087-A 1 26-DEC-1988;

MITSUI TOATSU CHEM INC

OS Rhodosporidium

PN JP 1983317087-A/1

PN JP 1983317087-A/1

PN JP 1983317087-A/1

PN JP 1983317087-A/1

PN JP 1983317087-A/1

PN JP 198317087-A/1

PN JP 198317087-A/1

PN JP 1987152358

PF 18-JUN-1987 JP 1987152358

PF 18-JUN-1987 JP 1987152358

PF 18-JUN-1987 JP 1987152358

PF 18-JUN-1987 JP 1987152358

PF 18-JUN-1987 JP 1987152358

PF 18-JUN-1987 JP 1987152358

PF 18-JUN-1987 JP 1987152358

PF 18-JUN-1987 JP 1987152358

PF 18-JUN-1987 JP 1987152358

PF 18-JUN-1987 JP 1987152358

PF 18-JUN-1987 JP 1987152358

PF 18-JUN-1987 JP 1987152358

PF 18-JUN-1987 JP 1987152358

PF 18-JUN-1987 JP 1987152358

PF 18-JUN-1987 JP 1987152358

PF 18-JUN-1987 JP 1987152358

PF 18-JUN-1987 JP 1987152358

PF 18-JUN-1987 JP 1987152358

PF 18-JUN-1987 JP 1987152358

PF 18-JUN-1987 JP 1987152358

PF 18-JUN-1987 JP 1987152358

PF 18-JUN-1987 JP 1987152358

PF 18-JUN-1987 JP 1987152358

PF 18-JUN-1987 JP 1987152358

PF 18-JUN-1987 JP 1987152358

PF 18-JUN-1987 JP 1987152358

PF 18-JUN-1987 JP 1987152358

PF 18-JUN-1987 JP 1987152358

PF 18-JUN-1987 JP 1987152358

PF 18-JUN-1987 JP 1987152358

PF 18-JUN-1987 JP 1987152358

PF 18-JUN-1987 JP 1987152358

PF 18-JUN-1987 JP 1987152358

PF 18-JUN-1987 JP 1987152358

PF 18-JUN-1987 JP 1987152358

PF 18-JUN-1987 JP 1987152358

PF 18-JUN-1987 JP 1987152358

PF 18-JUN-1987 JP 1987152358

PF 18-JUN-1987 JP 1987152358

PF 18-JUN-1987 JP 1987152358

PF 18-JUN-1987 JP 1987152358

PF 18-JUN-1987 JP 1987152358

PF 18-JUN-1987 JP 1987152358

PF 18-JUN-1987 JP 1987152358

PF 18-JUN-1987 JP 1987152358

PF 18-JUN-1987 JP 1987152358

PF 18-JUN-1987 JP 1987152358

PF 18-JUN-1987 JP 1987152358

PF 18-JUN-1987 JP 1987152358

PF 18-JUN-1987 JP 1987152358

PF 18-JUN-1987 JP 1987152358

PF 18-JUN-1987 JP 1987152358

PF 18-JUN-1987 JP 1987152
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                2341
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         2246
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 2281
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          2186
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     2161
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             2101
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1981
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      2221
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    2066
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         2006
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              2041
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1946
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       E01784
DNA sequence coding f.
E01784
E01784.1 GI:2170037
JP 1988317087-A/1.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        unidentified
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 unidentified
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         unclassified.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                NGTNNNCANNNA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           ACGTCCTCGAGGATGCTCGCNTAGNNNCNCNNNCNANNCTCGCNTNNNNNCCNNNCNC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                TGACGATCGGCACCAACGTCTCCCGGCATCTACGAGGCCATCAAGNNCGGCNGCATCAACC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CGTCGTCGTCGCCCGCGCTCNCGTACCTCTCGCCGCGCACGCGCGTCCTGTACTCGTTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         TCGTTCTTGGCTGCCTCTC - TAGACCGTGTCGGTATTACCTCGAGATTGTGAATACAAGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          TATCCCGCCTGCACTCTTAGGACTCGCTTCTTGTCGGACTCGGATCTCGCATCGCTTCTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             NNNCCNNNNNNNNCTNTTNGNNNTCGNNTCNTGNCNNNNNNCGGANNTNNCNNCNNNNNNN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           TCCGCGAGGAGCTCGGCGTCAAGGCCCGCCGCGCGACGTCTTCCTCGGCAAGCAGGAGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    AGTACCCATCCA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           THNINGTHNCTONCHONNANCINGTONTHWINNICTHNIGHTHNINHMINCHNIC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               ACGTECTECAAGATGETEGETTAGACACTETTECCACTETEGEATCCCTTECATACCE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 TGACGATCGGCTCGAACGTCTCCAAGATCTACGAGGCCATCAAGTCGGGCAGGATCAACA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         /product='L-phenylalanine
2152. .2331.
Location/Qualifiers
1..2331
                                                                                                                                              1. .2331
/organism="unidentified"
/mol_type="genomic DNA"
/db_xref="taxon:32644"
                         67.8%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    2316
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             2352
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      for
   Score 1677.4; DB 6;
Pred. No. 1.3e-174;
0; Mismatches 425;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   2331 bp DNA linear I
L-phenylalanine ammonialyase
                                                           Length
                                                               2331;
```

PAT 29-SEP-1997

2304 2340 2245 2185 2220 2125 2160 2065 2100 2005

뮍 δ

Indels

36;

Gaps

6

A 40 B 55 B

8 g d 8 B Ś 밁 8 B 8 В S 8 8 B 8 g δ Б Š Дb 5 В Ó 밁 δ 밁 Ś

1 ATGGCCCCCTCCONTCONTCCACACCTCCACCTCCACCACCACCACCACCACCACCAC
5 B 5 B 5 B 5 B 5 B 5 B 5 B 5 B 5 B 5 B
1081 GACCACCAGGACCATTCCCCCCAGGACCCCTCACCTCCACCTCCACCTCCACTCCCCCCCC

S S S

밁

δÃ

Вb

В

₽ 8

A 40

Ş

Вb

8 8 8 8 8 8 8 δ

g

당 성 당 성

B 8

```
В
                                                                       Ş
                                                                                                           뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       DEFINITION
ACCESSION
VERSION
KEYWORDS
                  Ś
                                                                                                                                      Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           SOURCE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      RESULT
E01785
LOCUS
                                                                                                                                                                                                                                         ORIGIN
                                                                                                                                                                                                                                                                                                                   FEATURES
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     망
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Вb
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      COMMENT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 REFERENCE
                                                                                                                                                                       Query Match
Best Local Similarity
Matches 1891; Conserv
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    JOURNAL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 TITLE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               AUTHORS
                                                                                                                                                                                                                                                                                                    source
                                                                                                                                                                                                                                                                                                                           CONTROL OF ADVENTITIOUS GENE MANIFESTATION AND PRO
ADVENTITIOUS GENE PRODUCT USING SAID CONTROL

Patent: JP 198817088-A 1 26-DEC-1988;
MITSUI TOATSU CHEM INC .

OS Rhodosporidium toruloides
PN JP 198317088-A/1
PD 26-DEC-1988
PF 18-JUN-1987 JP 1987152359
PI FUKUHARA NOBUHIRO, YOSHINO SADAO, WATANABE MI
YAMAMOTO KAORU,
PI SUZUKI MAKKI, NAKAJIMA YOSHIYUKI
PC C12N15/00,C12N9/88,(C12N9/88,C12R1:01);
CC strandedness: Double;
CC topology: Linear;
CC hypothetical: No;
CC *source: Strain=IFO 559 (ATCC 10788);
FH Key
FT CDS

1. .2151
FT CDS

2152. .2331.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       E01785

DND NAN sequence coding for L-plenylalanine ammonialyase.

E01785.1 GI:2170038

JP 1988317088-A/1.

Rhodosporidium toruloides

MRhodosporidium toruloides

SURATYOTA; Fungi; Basidiomycota; Urediniomycetes;
Microbotryomycetidae; Sporidiobolales; Rhodosporidium.

1 (bases 1 to 2331)

Fukuhara, N., Yoshino, S., Watanabe, M., Yamamoto, K., Suzuk:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                2341
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 2246
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            2186
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         2126
                   121
                                                 61
                                                                             13
                                                                                                                                            \vdash
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Nakajima,
GCTGGCTCCTCCCGACCACCCAGNNGACGCAGCTCGACATCGTNGAGNAGATCCTCGCCG
                                                                                                                               ATGGCCCCCTCCNTCGACTCGATCGCGACCTCGNTCGCCAACGGCNTCNCNAACGGNTNG
                                                   CAGGCTGT-----
                                                                             CACGCCGNNCCGNCNNNGNCGNCNACGGGCGCCACGTCCACNCTCNGNCGGCCGNCGCNG
                                                                                                             ATGCCACCCTCGACTCGATCTCGCACTCGTTCGCAAACGGCGTCGCATCCGCAAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      ACGTCCTCCTCAAGATGCTCGCTTAGACACTCTTCCCAACTCTCGCATCCCTTCCATACCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   AGTACCCATCCA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                NGTNNNCANNNA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             TCGTTCTTGGCTGCCTCTC-TAGACCGTGTCGGTATTACCTCGAGATTGTGAATACAAGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         TATCCCGCCTGCACTCTTAGGACTCGCTTCTTGTCGGACTCGGATCTCGCATCGCTTCTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       NNICCNININININICINTTINGNINTCGINTCNTGICHININICGGANITINICINICININININI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           THRENCHMICTION CTCICCIONNINANCINGTCINTINANNINCTININGINITAINNINNINCININC
                                                                                                                                                                            Conservative
                                                                                                                                                                                                                                                                                            /product='L-phenylalanine ammonialyase'
2152..2331.
Location/Qualifiers
1..2331
                                                                                                                                                                                                                                                 /organism="Rhodosporidium
/mol_type="genomic DNA"
/db_xref="taxon:5286"
                                                                                                                                                                                     67.8%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                2352
                                                                                                                                                                        0
                                                                                                                                                                                       Score 1677.4; DB 6; Pred. No. 1.3e-174;
                                                                                                                                                                          Mismatches
                                                 -CAATGGCGCCTCGACCAACCTC----GCAGTCGCAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     SADAO, WATANABE MIDORI,
                                                                                                                                                                                                                                                                                    toruloides'
                                                                                                                                                                        425;
                                                                                                                                                                        Indels
                                                                                                                                                                                                    Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                PRODUCTION
                                                                                                                                                                                                        2331;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Suzuki, M.
                                                                                                                                                                        36;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ę
                                                                                                                                                                        Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                얶
                                                                                                                                                                                                                                                                                                                                               뛰
                                                                             120
                  180
                                               100
                                                                                                             60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             2304
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           2340
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         2245
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        2280
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      2185
                                                                                                                                                                        6
                     Ś
                                                         В
                                                                                    S
                                                                                                                                               Ş
                                                                                                                                                                                    밁
                                                                                                                        밁
                                                                                                                                                                                                              δ
                                                                                                                                                                                                                                                   ₽
                                                                                                                                                                                                                                                                             Ś
                                                                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                                       8
                                                                                                                                                                                                                                                                                                                                                                          멼
                                                                                                                                                                                                                                                                                                                                                                                                      Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                       8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               망
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          먉
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Вb
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             ₽,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                             1117
                                                                                            1141
                               1201
                                                                                                                          1057
                                                                                                                                                        1081
                                                                                                                                                                                                                   1021
                                                                                                                                                                                       997
                                                                                                                                                                                                                                                   937
                                                                                                                                                                                                                                                                                961
                                                                                                                                                                                                                                                                                                                877
                                                                                                                                                                                                                                                                                                                                              901
                                                                                                                                                                                                                                                                                                                                                                           817
                                                                                                                                                                                                                                                                                                                                                                                                         841
                                                                                                                                                                                                                                                                                                                                                                                                                                         757
                                                                                                                                                                                                                                                                                                                                                                                                                                                                      781
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      697
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  721
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 637
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               661
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                577
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            601
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            517
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          541
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     481
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     397
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       457
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  421
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                337
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               277
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           218
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        161
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   101
                   TCGACGACGACGACACCCGCTCATCGACGTCGAGAACAAGANGACCCACCACGGCGGCGAC
                                                                                          GGCCCGCTCGTCAGCGACATGATTCACGCCCACGCNGTCCTCTCGCTCGAGGCCGGNCAG
                                                                                                                          GACGACGAGGGCATTCTCCGCCAGGACCGCTACCCCTTGCGCACGTCTCCTCAGTGGCTC
                                                                                                                                                        GACGACGAGGGCATTCTCCGCCAGGACCGCTACCCGCTCCGCACGTCGCCTCAGTGGCTC
                                                                                                                                                                                                             CGCACGCTCCTCGAGGGCAGCNNGTTTGCCGTCCACCACGAGGAGGAGGAGGTCAAGGTCAAG
                                                                                                                                                                                                                                                                                                                                                                                            GCCGTCTCCGCCTCGACGACGACGCACACATGCTCTCGCTCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            GTCAACTCGCTCACNCGCGGCCACTCGGCNGTCCGCCTCGTCGTCCTCGAGGCGCTCACC
   TCGACGACCGACAACCCTCTCATCGACGTCGAGAACAAGACTTCGCACCACGACGGCGAT
                                                             ĠĠĊĊĊĠĊŦĊĠŦĊĂĠĊĠĂĊĊŤĊĂŤŤĊĂĊĠĊĊĊĂĊĠĊĊĠŦĊĊŤĊĂĊĊĂŤĊĠĂĠĠĊĊĠĠĊĊĂĠ
                                                                                                                                                                                     CGCAAGCTCCTCGAGGGAAGCCGCTTTGCTGTCCACCATGAGGAGGAGGATCAAGGTCAAG
                                                                                                                                                                                                                                                   CCCTTCCTTCACGACGTCACGCGCCCTCACCCGACGCAGATCGAAGTCGCGGGAAACATC
                                                                                                                                                                                                                                                                               CONTTCCTCCACGACGTCACGCGCCCTCACCCGACCCAGATCGAGGTCGCGCGCAACATC
                                                                                                                                                                                                                                                                                                                                            TCGCAGGCGCTCACGGCTCTNACGGTCGAGGCCATGGTCGGCCACGCCCGGCTCGTTCCAC
                                                                                                                                                                                                                                                                                                                                                                           GCCGTCTCAGCATCGATGGCCACCCTCGCTCTGCACGACGCACACATGCTCTCGCTCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                 TINGGICTCGAGCCCGTCGTCCTCGGCCCGAAGGAGGGTCTCGGTCTCAACGGCACG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  AACTTCCTCAACCACGGCATCACCCCCATCGTCCCCCCTCCGGGGCACCATCTCGGCGTCG
                                                                                                                                                                                                                                                                                                              TCGCAGTCGCTCACGGCCATGACGGTCGAAGCGATGGTCGGCCACGCCCGGCTCGTTCCAC
                                                                                                                                                                                                                                                                                                                                                                                                                                         TTCAACCTCGAGCCCGTCGTCCTCGGCCCGAAGGAAGGTCTCGGTCTCGTCAACGGCACC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    GTGCACGTCGTCCACGAGGGCAAGGAGAAGATCCTGTACGCCCGCGAGGCGATGGCGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          GTNCACGTNNTNCACGAGGGCANNGAGAAGATCATGTNCGCCCGCGAGGCGATCGCGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 GGCGACCTCTCTCTCTCCTACATTGCAGCGGCCATCAGCGGTCACCCGGACAGCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       GGCGACCTCTCCCCCCCCCCTCTCNTACATCGCCGCCGCCATCACCGGTCACCCGGACNNCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               AACTTCCTCAACCACGGCATCACCCCCATCGTCCCCCTCCGCGGCACCATCTCTGCGTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          GTCAACAGCTTGACCCGCGGCCACTCGGCTGTCCGCCTCGTCCTCGAGGCGCTCACC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       GGCCGCGGTCTCGAGAACTCGCTTCCCCTCGAGGTTGTTCGCGGCGCCATGACAATCCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                GENCGCGGCCTCGAGAACTCGCTTCCGCTCGAGGTCGTCGGCGGGGGGCCATGACCATCCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GCTCTCCTCGAGCACCAGCTCTGCGGGTGTTCTCCCTTCGTCGTTCGACTCGTTCCGCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 GCNCTCCTCGAGCACCAGCTCTGCGGTGTNCTCCCNACGTCGNTCGANTCCTTCNGCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      ACGACTGGTTTCGGCGGCTCGGCCGACACCCCGGACTGAGGATGCNATCTCGCTCCAGAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        AAGATCGACAANAGNGTCGAGTTCCTCCGNNCNCAGCTCNACAACAGNGTCTACGGNGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      ACCCCACCGNNACGNACGNNNTCGAACTCGACGGGTACACCCTCACCCTCGGNGACGTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                ACGACTGGATTTGGCGGATCCGCAGACACCCGCACCGAGGACGCCATCTCGCTCCAGAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            AAGATTGACAAATCGGTCGAGTTCTTGCGCTCGCAACTCTCCATGAGCGTCTACGGCGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           TCTCGGCCGCGAGGAAGGGCAGGCCTGTCCGCGTCAAGGACAG-CGACGAGATCCGCTCA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       TCGGCGCCCCAAGGGCCGCNCNGTCCGCGTCNCAGACAGNCGACGAGATCCGCGCA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      CGCCGACCGACTCGA----CGCTCGAACTCGACGGCTACTCGCTCAACCTCGGAGACGTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GCTCGCACCTGCCCACACCCCAGGTCACGCAGGTCGACATCGTCGAGAAGATGCTCGCCG 160
                                                                                          1200
                                                             1176
                                                                                                                          1116
                                                                                                                                                      1140
                                                                                                                                                                                     1056
                                                                                                                                                                                                                   1080
                                                                                                                                                                                                                                                 996
                                                                                                                                                                                                                                                                               1.020
                                                                                                                                                                                                                                                                                                              936
                                                                                                                                                                                                                                                                                                                                              960
                                                                                                                                                                                                                                                                                                                                                                           876
                                                                                                                                                                                                                                                                                                                                                                                                         900
                                                                                                                                                                                                                                                                                                                                                                                                                                         916
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          576
                                                                                                                                                                                                                                                                                                                                                                                                                                                                      840
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    756
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  780
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 969
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             636
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           660
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        600
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      516
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   456
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                396
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            336
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           276
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    217
```

```
Ş
                                                                                                                                                                                                                                                                                                                В
                                                                                                                                                                                                                                                                                                                                            Ş
                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             D,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   B.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    B
                                                                                                                                      Š
                                                                                                                                                                           밁
                                                                                                                                                                                                                                            В
                                       片
                                                                     S
                                                                                                         Db
                                                                                                                                                                                                          S
S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1417
                                                                                                                                         2161
                                                                                                                                                                                                                                                                                                                1946
                                                                                                                                                                                                                                                                                                                                                 1981
                                                                                                                                                                                                                                                                                                                                                                                   1886
                                                                                                                                                                                                                                                                                                                                                                                                                    1921
                                                                                                                                                                                                                                                                                                                                                                                                                                                    1837
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1861
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1777
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1801
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1717
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1741
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1657
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1681
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1597
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1621
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1537
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1561
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1477
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1501
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1441
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1357
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1381
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1297
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1321
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1261
                                                                                                                                                                                                             2101
                                                                                                                                                                                                                                             2006
                                                                                                                                                                                                                                                                              2041
                                                                                                                                                                                                                                                                                                                                                                                                                                                                             NNGTCCTCGCCNNNNGCCANNAGGTCTCGCTCGCNGCCGTCAACGCCTGGAAGGTCGCCT 1920
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      CAGGCCGTCGACCTCCGCGCGATGGAGTTCGAGTTCAAGAAGCAGTTCGACCCGNTNNTC 1680
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           GGCAAGCTCAACTTCACGCAGCTCACCGAGATGCTCAACGCCGGCATGAACCGCCGGCCTN 1380
                                                                                                                                                                                                 TGACGATCGGCACCAACGTCTCCCGCATCTACGAGGCCATCAAGNNCGGCNGCATCAACC
                                                                                                                                                                                                                                                                      TCCGAGGAGGTCAAGGCCCCCCCGCGGGACGTCTTCCTCGCCAAGCAGGAGGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               CTCGAGCCGCGCTGGCACGACGCCTTCTCGTTCGCGACCGGCACCGTCGTCGAGNNNNNN 1860
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          GTCTCGCTCATCGACCAGCACTTTGGCTCCGCCATGACCGGCTCGAACCTGCGCGACGAG 1716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            ACNGCCGAGGCCAACGACGTCCTTTCTCTCCTCCTCGCCACCTCTACTGCGTNCTC 1620
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 CAGCCGGCTGAGATGGCGAACCAGGCGGTCAACTCGCTTGCGCTCATCTCGGCTCGTCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CAGCCGGCNGAGATGGGCAACCAGGCCGTCAACTCGCTCGCNCTCATCTCGGCNCGCCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   GCCGCTGCGGCGTACACCTCGGAGTTGGGACACCTCGCCAACCCTGTGACGACGCATGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   GCCGCNGCNGCNTACACTTCGGAGCTCGGNCACCTTGCCAACCCGGTNACGACCCACGTC 1500
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CCNTCCTGCCTCGCTGCCGAGGACCCNTCGCTCTCTATCACTGCAAGGGCCTCGACATT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        THINNICATINGTCHCHCHCHUNNANCHNGTCHNTHNNHHCTHNNGHNTHNHHNHHCHNHC
                                                                         NNNCCNNNNNNNCTNTTNGNNNTCGNNTCNTGNCNNNNNCGGANNTNNCNNCNNNNNNN 2280
                                                                                                         ACGTCCTCCTCAAGATGCTCGCTTAGACACTCTTCCCACTCTCGCATCCCTTCCATACCC
                                                                                                                                    ACGTCCTCGTCAAGATGCTCGCNTAGNNNCNCNNCNANNCTCGCNTNNNNNCCNNNCNC
                                                                                                                                                                             TGACGATCGGCTCGAACGTCTCCAAGATCTACGAGGCCATCAAGTCGGGCAGGATCAACA
                                                                                                                                                                                                                                               CGACCTCGTCGCCCGCGCTCTCGTACCTCTCGCCGCGCACTCAGATCCTCTACGCCTTCG
                                                                                                                                                                                                                                                                                                                                              cercercercececercneeracercreecececececerereracreerrer
                                                                                                                                                                                                                                                                                                                                                                                  CCGCCGAGTCGGCCACCCGCCAAGTCCGCGAGACCTTCTGGTCCGCCGCGC
                                                                                                                                                                                                                                                                                                                                                                                                                ccecceaeaaeeccarcreecreacececnanercceceacnecrrereenceecnecer 1980
                                                                                                                                                                                                                                                                                                                                                                                                                                                  TCGTCGACGTC------GCTCTCGCTCGCCGCCGTCAACGCCTGGAAGGTCGCCG 1885
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CTCGTCCCGCGCTGGCACGACGCCTTCTCCTTCGCCGCCGGCACCGTCGTCGAGGTCCTC 1836
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CTCGTCGAGAAGGTGAACAAGACGCTCGCCAAGCGCCTCGAGCAGACCAACTCGTACGAC 1776
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CTCGNGGACAAGGTCAACAAGNCGCTCNACAAGCGNCTCGAGCAGACCAACTCGTACGAC 1800
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             ACGACCGAGTCCAACGACGTCCTTTCTCTCCTCCTCGCCACCCCACCTCTACTGCGTTCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CCCTCCTGCCTCGCGGCCGAAGACCCCCTCGCTCCCTACCACTGCAAGGGCCTCGACATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      GGCAAGCTCAACTTCACGCAGCTCACCGAGATGCTCAACGCCGGCATGAACCGCGGCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CGACTTGCGCGCGATCGAGTTCGAGTTCAAGAAGCAGTTCGGCCCAGCCATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1476
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1416
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1440
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1296
                                                                                                                                                                                                                                                                                                                                                                                   1945
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1656
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1596
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1536
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1320
                                                                                                                                                                               2125
                                                                                                                                                                                                             2160
                                                                                                                                                                                                                                               2065
                                                                                                                                                                                                                                                                                                                                                 2040
                                                                                                                                                                                                                                                                               2100
                                                                                                                                                                                                                                                                                                                 2005
```

TCGTTCTTGGCTGCCTCTC-TAGACCGTGTCGGTATTACCTCGAGATTGTGAATACAAGC

```
ACCESSION
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  SOURCE
ORGANISM
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      VERSION
KEYWORDS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          RESULT 8
RTPALGNA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Ş
                                  δ
                                                                                                 밁
                                                                                                                                                  Ş
                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                         Š
                                                                                                                                                                                                                                                                                                                        뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            ORIGIN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    COMMENT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  REFERENCE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          FEATURES
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              AUTHORS
JOURNAL
                                                                                                                                                                                                                                                                                                                                                                                                                                     Matches
                                                                                                                                                                                                                                                                                                                                                                                                                                                            Query Match
Best Local Similarity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CDS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             polyA_site
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   source
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       2341 NGTNNNCANNNA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       2305
161
                                                181
                                                                                                       101
                                                                                                                                                          121
                                                                                                                                                                                                                 61
                                                                                                                                                                                                                                                                    61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           L-phenylalanine ammonia-lyase; PAL gene.
Rhodosporidium toruloides
Rhodosporidium toruloides
Eukaryota; Fungi; Bassidiomycota; Urediniomycetes;
Microbotryomycetidae; Sporidiobolales; Rhodosporidium
                                                                                                                                                                                                                                                                                                                           _
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      R.toruloides mRNA for L-phenylalanine
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     X12702.1
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Unpublished
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       (Patented)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    AGTACCCATCCA
                                                                                                                                                                                                                    CAGGCTGT---
                                                   ACCCCACCONNACGNACGNNNTCGAACTCGACGGGTACACCCTCACCCTCGGNGACGTCG
                                                                                                                                                             GCTCGCTCCCGACCACCCAGNNGACGCAGCTCGACATCGTNGAGNAGATCCTCGCCG
                                                                                                                                                                                                                                                                    CACGCCGNNCCGNCNNNGNCGNCNACGGGCGCCACGTCCACNCTCNGNCGGCCGNCGCNG
                                                                                                                                                                                                                                                                                                                        ATGGCACCCTCGACTCGATCTCGCACTCGTTCGCAAACGGCGTCGCATCCGCAAAG
                                                                                                                                                                                                                                                                                                                                                                            ATGGCCCCCTCCNTCGACTCGATCGCGACCTCGNTCGCCAACGGCNTCNCNAACGGNTNG
                                                                                                       GCTCGCACCTGCCCACAACCCAGGTCACGCAGGTCGACATCGTCGAGAAGATGCTCGCCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  (bases 1 to 2315)
                                                                                                                                                                                                                                                                                                                                                                                                                                     Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       /Godon_start=1
/Godon_start=1
/product="L-phenylalanine ammonia-lyase"
/protein_id="C-phenylalanine ammonia-lyase"
/protein_id="C-pA331209.1"
/db_xref="GA331209.1"
/db_xref="GH:288351"
/db_xref="GH:288351"
/db_xref="SHIS-PROTE-151544"
/db_xref="SHIS-PROTE-151544"
/db_xref="SHIS-PROTE-151544"
/db_xref="SHIS-PROTE-151544"
/db_xref="SHIS-PROTE-151544"
/db_xref="SHIS-PROTE-151544"
/db_xref="SHIS-PROTE-151544"
/db_xref="SHIS-PROTE-151544"
/db_xref="SHIS-PROTE-151544"
/db_xref="SHIS-PROTE-151544"
/db_xref="SHIS-PROTE-151544"
/db_xref="SHIS-PROTE-151544"
/db_xref="SHIS-PROTE-151544"
/db_xref="SHIS-PROTE-151544"
/db_xref="SHIS-PROTE-151544"
/db_xref="SHIS-PROTE-151544"
/db_xref="SHIS-PROTE-151544"
/db_xref="SHIS-PROTE-151544"
/db_xref="SHIS-PROTE-151544"
/db_xref="SHIS-PROTE-151544"
/db_xref="SHIS-PROTE-151544"
/db_xref="SHIS-PROTE-151544"
/db_xref="SHIS-PROTE-151544"
/db_xref="SHIS-PROTE-151544"
/db_xref="SHIS-PROTE-151544"
/db_xref="SHIS-PROTE-151544"
/db_xref="SHIS-PROTE-151544"
/db_xref="SHIS-PROTE-151544"
/db_xref="SHIS-PROTE-151544"
/db_xref="SHIS-PROTE-151544"
/db_xref="SHIS-PROTE-151544"
/db_xref="SHIS-PROTE-151544"
/db_xref="SHIS-PROTE-151544"
/db_xref="SHIS-PROTE-151544"
/db_xref="SHIS-PROTE-151544"
/db_xref="SHIS-PROTE-151544"
/db_xref="SHIS-PROTE-151544"
/db_xref="SHIS-PROTE-151544"
/db_xref="SHIS-PROTE-151544"
/db_xref="SHIS-PROTE-151544"
/db_xref="SHIS-PROTE-151544"
/db_xref="SHIS-PROTE-151544"
/db_xref="SHIS-PROTE-151544"
/db_xref="SHIS-PROTE-151544"
/db_xref="SHIS-PROTE-151544"
/db_xref="SHIS-PROTE-151544"
/db_xref="SHIS-PROTE-151544"
/db_xref="SHIS-PROTE-151544"
/db_xref="SHIS-PROTE-151544"
/db_xref="SHIS-PROTE-151544"
/db_xref="SHIS-PROTE-151544"
/db_xref="SHIS-PROTE-151544"
/db_xref="SHIS-PROTE-151544"
/db_xref="SHIS-PROTE-151544"
/db_xref="SHIS-PROTE-151544"
/db_xref="SHIS-PROTE-151544"
/db_xref="SHIS-PROTE-151544"
/db_xref="SHIS-PROTE-151544"
/db_xref="SHIS-PROTE-151544"
/db_xref="SHIS-PROTE-1515444"
/db_xref="SHIS-PROTE-1515444"
/db_xref="SHIS-PROTE-1515444"
/db_xref="SHIS-PROTE-151544444"
/db_xre
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             /organism="Rhodosporidium
/mol_type="mRNA"
/strain="IFO 559"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     ) EP_0_260_919_A1.
Location/Qualifiers
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   gene="PAL"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      'gene="PAL"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             clone="pSW13"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GI:288350
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      . .2315
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               .2151
                                                                                                                                                                                                                                                                                                                                                                                                                                                         67.7%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      .2315
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         _xref="taxon:5286"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       2352
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       2316
                                                                                                                                                                                                                    -----CAATGGCGCCTCGACCAACCTC----GCAGTCGCAG
                                                                                                                                                                                                                                                                                                                                                                                                                               Score 1676.4; DB 8; Pred. No. 1.7e-174; 0; Mismatches 422;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     mRNA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       toruloides"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            ammonia-lyase (PAL).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     linear
                                                                                                                                                                                                                                                                                                                                                                                                                                        Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              2315
                                                                                                                                                                                                                                                                                                                                                                                                                                     36;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   PLN 23-MAR-1993
                                                                                                                                                                                                                                                                                                                                                                                                                                        Gaps
                                                                                                                                                                180
                                                      240
                                                                                                                                                                                                                    100
     217
                                                                                                            160
                                                                                                                                                                                                                                                                                                                                 60
                                                                                                                                                                                                                                                                                                                                                                                    60
                                                                                                                                                                                                                                                                                                                                                                                                                                           σ,
```

B 8 B 8 B 8

		,	•	,	•					0 \	0 ~	0 ~	0 \	0 \	0 ~	0 ~	0 \
TTCCAGGCGNCCGCTGTCGCNAACACGATGGAGAAGACTCGCCTCGC	TCGACGACCGACAACCCGCTCATCGACGTCGAGAACAAGANGACCCACCACGGCGGCAAC 1	ι.— ι. 		1021 CGCACGCTCCTCGAGGGCAGCNNGTTTGCCGTCCACCACGAGGAGGAGGACGACGACGAGGTCAAG 1080	961 CCNTTCCTCCACGACGTCACGCCCCTCACCCGACCCAGATCGAGGTCGCGCGCG	901 TCGCAGGCGCTCACGGCTCTNACGGTCGAGGCCATGGTCGGCCACGGCCGGCTCGTTCCAC 960	841 GCGFTCTCCGCCTCGATGGCGACGCTCGCTCTGCACGACGCACACATGCTCTCGCTCCTC 900	781 TINGGTCTCGAGCCCGTCGTCCTCGGCCCGAAGGAGGGTCTCGGTCTCGTCAACGGCACG 840	721 GTNCACGINNTNCACGAGGGCANNGAGAAGATCATGINCGCCCGCGAGGCGATCGCGCTC 780	661 GGCGACCTCTCCCCNCTCTCNTACATCGCCGCCCATCACCGGTCACCGGACNCAAG 720	601 AACTTCCTCAACCACGGCATCACCCCCATCGTCCCCCTCCGCGGCACCATCTCGGCGTCG 660	541 GTCAACTCGCTCACNCGCGGCCACTCGGCNGTCCGCCTCGTCGTCCTCGAGGCGCTCACC 600	481 GGNCGCGGCTCGAGAACTCGCTTCCGCTCGAGGTCGTCGGGGGCCCATGACCATCCGC 540	421 GCNCTCCTCGAGCACCAGCTCTGCGGTGTNCTCCCNACGTCGNTCGANTCCTTCNGCCTC 480	361 ACGACTGGTTTCGGCGGCCCGACCACCCCGGACTGAGGATGCNATCTCGCTCCAGAAG 420	301 AAGATCGACAANAGNGTCGAGTTCCTCCGNNCNCAGCTCNACAACAGNGTCTACGGNGTC 360	241 TCGGCGCCGCNCGCAAGGGCCGCNCNGTCCGCGTCNCAGACAGNCGAGACGAGA
	*																
B 8	Db Qy	D QV	Db Qy	B &	рь Оу	g gg	β &	dg dg	y da y	Q2 V2	do do	Db Qy	B &	B &	D 62	B 8	Db Qy
2341 NGTNNNCA 2348 	2281 THNHNCHTHNCTCHCHNNNHANCNNGTCHNTHNHNHNCTHNHGNHTHNHNHNHNCHNHC 2340		61 ACG      26 ACG	1 TGA	1-0	981 ( 946 (	1921 CCGCCGAGAAGGCCATCTCGCTCACGCGCANACTCCGCGACNCCTTCTGGNCGGCNCCGT 					1		8=8		7	21 GG 

1756 CTTGCGCTCGAGGTCAAGAAGGCGCTCAACAAGCGTCTCGAGCAGACGACGACGACGACGTACGAC 1815 1801 CTCGAGCCGCGCTGGCACGACGCCTTCTCGTTCGCGACCGAC	- da da	CGCCATCACCGGTCACCCGGACNNCAAG 720 	661 GGCGACCTCTCCCCCNCTCTCNTACATCGCCGCCGCCGCCATCACCGGGTCACCCGGACNNCAAG	Qy 6
CTCGNGGACAAGGTCAACAAGNCGCTCNACAAGCGNCTCGAGCAAGCGACCAACTCGTACGAC	αα	recectreegegeacearctegegteg 660	601 AACTICCTCAACCACGGCATCACCCCCATCGTCCCCCTCCGCGGCACCATCTCGGCGTC	Qy 6
1621 CAGGCCGTCGACCTCCGCGGATGGAGTTCGAGTTCAAGAAGCAGTTCGACCCGNTNNTC 1800	0 B 6	CCGCCTCGTCGTCCTCGAGGCGCTCACC 600	541 GTCAACTCGCTCACNCGCGGCCACTCGGCNGTC	QY 5
ACHOCCHANGE CANCERCY IN INCIDENCE IN CONCERNATION OF A CHARGE CANCERCY CANC	رې دې	CTTCCGCTCGAGGTCGTCGCGCGGCGCATGACCATCCGC 540	481 GGNCGCGGCCTCGAGAACTCGCTTCCGCTCGA	Qγ 4 Db 5
OI CAGCCGGCNGAGAIGGGCAACCAGGCGTCAACTCGCTCGCNCTCAICTCGGCNCTCACCTCGCCNCTCAICTCGGCNCTCACCTCGCCNCTCAICTCGGCNCTCACCTCGCCCGCCGCCGCCGCCGCCGCCGCCGCCGCAGAAGATGGGCAACCAGGCCGTCAACTCGCTCG	5 g &	TGCGGTGTNCTCCCNACGTCGNTCGANTCCTTCNGCCTC 480	421 GCNCTCCTCGAGCACCAGCTCTGCGGTGTNCTCCCNA	Qy 4 Db 4
GCGCNGCNGCNTACACTTCGGAGCTGGNCACCTTGCCAACCCGGTNACGACCCACGTGCACGTGCAACCCGGTNACGACCCACGTGCACGCGGTNACGACCCACGTGCAACCCGGTNACGACCCACGTGCAACCCGGTNACGACCCACCTGCAACCCGGTNACGACCCACCTGCCAACCCGGTNACGACCCACCTGCCAACCCGGTNACGACCACCTTCGTCCACCTGCCAACCCGGTCACTACCTTCGTCCACCTGCCAACCCCGGTCACTACCTTCGTCCACCTGCCAACCCGGTCACTACCTTCGTCCACCTGCCAACCCGGTCACTACCTTCGTCCACCTGCCAACCCGGTNACGACCCACCCTGCCAACCCGGTNACGACCCACCCTGCCACCCGGTNACGACCCACCCACCCACCCACCCACCCACCCACCCACCC	da Ao	GAGGATGCNATCTCGCTCCAGAAG 42          gaggaTgcagTCAGCCTCCAGAAG 45	61 ACGACTGGTTTCGGCGG	Qγ 3 Db 3
1381 CONTOCTGCTGCTGCCGAGGACCONTGGTTCTCTATCACTGCAAGGGCTCGACATT 1440	QY dd	CCTCCGNNCNCAGCTCNACAACAGNGTCTACGGNGTC 360	01 AAGATCGACAANAGNGTCGAGTT	Qy 3
21 GECANGE LANGE LANGE LANGE CONTROL OF THE CONTROL OF GEOGRAPH CONTROL OF GEOGRAPHICAL CONTROL OF GEO	, מם קט	CGCGTCNCAGACAGNCGACGAGATCCGCGCA 300	41 TCGGCGCCGCNCGCAAGGGCCGCNCNGTC	QУ 2 Дъ 2
TICCAGCGNCGCTGTCGCNAACACGATGAGAAGACCCCCCCCCC	) B &	CGGGTACACCCTCACCCTCGGNGACGTCG 240	81 ACCCCACCGNNACGNACGNNNTCGAACTCGA	Qy 1 Db 2
201 TGARCGACCACCACCGGTCATCGACGTCGAGAACAAGAAGACGACCACCACGGCGGCAAC	da VQ	CAGCTCGACATCGTNGAGNAGATCCTCGCCG 180	.21 GCTCGCTCCTCCCGACCACCCAGNNGACG	Qy 1 Db 1
	QY	CCGNNCCGNCNNNGNCGNCNACGGGGGCGCCACGTCCACNCTCNGNCGGCCGCNCGCNG 120	61 CACGCCGNNCCGNCNNNGNCGNCNACGGGCGC	da VQ
81 GACGACGAGGGCATTCTCCGCCAGGACCGCTACCGGCTCCGCACGTCGCCTCAGTGGCTC	4g 4g	NTCGCCAACGGCNTCNCNAACGGNTNG 60	TGGCCCCTTCCNTCGACTCGAT	
1021 CGCACGCTCCTCGAGGGCAGCNNGTTTGCCGTCCACCACGAGGAGGAGGTCAAGGTCAAG 1080	עם עס	4; DB 6; Length 2419; .3e-169; es 504; Indels 25; Gaps 8;	h 65.8%; Score 1629.4 Similarity 78.0%; Pred. No. 2. 79; Conservative 0; Mismatch	Query Ma Best Loc Matches
961 CONTTOCTCCACGACGTCACGCGCCCTCACCCGACCCAGATCGAGGTCGCGCGCG	. Qy	7.0	~ C.	source ORIGIN
901 TCGCAGGCGCTCACGGCTCTNACGGTCGAGGCCATGGTCGGCCACGCCCGGCTCGTTCCAC 960	QQ QQ	eptide and polynucleotide y and using same 92;	ine ammonia and methods 6355468-A ocation/Qua	TITLE JOURNAL FEATURES
841 GCCGTCTCCGCCTCGATGGCGACCCTCGCTCTGCACGACGCACACATGCTCTCGCTCCTC 900	Qy		Unchassified. Unclassified. Unclassified to 2419) 1 (bases 1 to 2419) Yoshida.R.K. and Kootstra.A.B.	ORGANISM REFERENCE AUTHORS
781 TINGGICICGAGCCCGICGTCCTCGGCCCGAAGGAGGTCTCGGTCTCGTCAACGGCACG 840	Qy		AR199602.1 GI:20249676	ACCESSION VERSION KEYWORDS
721 GTNCACGTUNTNCACGAGGGCANNGAGAAGATCATGTNCGCCCGCGGAGGCGATCGCGCTC 780	Qy	DNA linear PAT 20-APR-2002	AR199602	RESULT 9 AR199602 LOCUS DEFINITION

```
LOCUS
DEFINITION
ACCESSION
                                                                                                                                                                                                                                                                                                                              RESULT 10
AX366860
                                                                                                                                                                                                                                                                   VERSION
KEYWORDS
                                                                                                                                                                                                                                                                                                                                                                                                 S
                                                                                                                                                                                                                                                                                                                                                                                                                       음 성
                                                                                                                                                                                                                                                                                                                                                                                                                                                                    В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             성 유
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Ś
                                                                                                                                                                                             REFERENCE
                                                                                                                                                                                                                                                                                                                                                                               맑
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Дb
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ъ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         8
                                                                                                                       FEATURES
                                                                                                                                                                                                                                                        SOURCE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Db
                                                                                                                                                                     TITLE
                                                                                                                                             JOURNAL
                                                                                                                                                                                                                                             ORGANISM
                                                            CDS
                                                                                                            source
                                                                                                                                                                                                                                                                                                                                                                               2412
                                                                                                                                                                                                                                                                                                                                                                                                      2401
                                                                                                                                                                                                                                                                                                                                                                                                                               2353
                                                                                                                                                                                                                                                                                                                                                                                                                                                     2341
                                                                                                                                                                                                                                                                                                                                                                                                                                                                             2293
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           2233
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    2161
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           2054
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  2041
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1994
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1981
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1934
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1921
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1876
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    2281
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   2221
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           2174
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           2114
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  2101
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1861
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1816
                                                                                                                                                                                                                                                                              AX366860
Sequence 12
AX366860
AX366860.1
                                                                                                                                  PCBU
                                                                                                                                        Yoshida,R.K. and Kootstra,A.B.
Phenylalanine ammonia lyase polypeptide and polynucleotide sequences and methods of obtaining and using same Patent: WO 0208402-A 231-JAN-2002;
                                                                                                                                                                                                                  Rhodotorula graminis
Rhodotorula graminis
Eukaryota, Fungi, Basidiomycota, Urediniomycetes,
Microbotryomycetidae, Sporidiobolales, mitosporic
                                                                                                                                                                                                       Rhodotorula
                                                                                                                                                                                                                                                                                                                                                                                AAAAAAAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           ACCCCAAGACCAGCTTTTCGACGTCGTGTCGTGCCAAGAACGGACTTTCCTCCATACACA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          TGACGATCGGCACCAACGTCTCCCGCATCTACGAGGCCATCAAGNNCGGCNGCATCAACC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       TCCGCGAGGAGCTCGGCGTCAAGGCCCCCCCGCGGGCGACGTCTTCCTCGGCAAGCACGAGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CGGCCGAGAAGGCCATCTCGCTCACGCGCGAGGTGCGCAACCGCTTCTGGCAGACGCCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CCGCCGAGAAGGCCATCTCGCTCACGCGCNANGTCCGCGACNCCCTTCTGGNCGGCNCCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       TCGTCCTCGCCTCTGCCA--ACGTCACCCTTACTGCCGTCAACGCGTGGAAGGTTGCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 NNGTCCTCGCCNNNNGCCANNAGGTCTCGCTCGCNGCCGTCAACGCCTGGAAGGTCGCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       NNNANAAA
                                                                                                                                                                                                                                                                                                                                                                                                                               GGTCGTCA-GTACACGTGTATAGAGCCTGGAATGGATTGCAAGTCTTCGAGTTCAAAAAA 2411
                                                                                                                                                                                                                                                                                                                                                                                                                                                      NGTIMINCAMINACNCNTNININININANNCNGGNANNGANTINIANGNITINICGNGNNCININININI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                              TGTCGCCTTACTCTCGCCGTCATCACGTCTCTCAGTTCTTTCGTATCCCGCGTCTCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   TNNNNCHTNNCTNNCTCNCNNNNANCNNGTCNNTNNNNNCTNNNGNNTNNNNNNNNCNNNC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 NNNCCNNNNNNNCTNTTNGNNNTCGNNTCNTGNCNNNNNCGGANNTNNCNNCNNNNNNN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           ACGTCCTCGTCAAGATGCTCGCGTA-AGGCCCGAGCAAGCCTCGCCTAGACGCCCGCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  ACGTCCTCGTCAAGATGCTCGCNTAGNNNCNCNNNCNANNCTCGCNTNNNNNCCNNNCNC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            AGACGATCGGGAGCAACGTCTCGCGCATCTACGAGGCCATCAAGGACGGCCGCATCAACC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CTTCGCAGGCGCCGCGCACGCATACCTCTCGCCGCGCACGCGCGTCCTGTACTCGTTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         TGCGCGAGGAGCTCGGCGTGCAGGCGCGCCGCCGCGACGTGTTTGTCGGCGTGCAGCAGG
                                                                                                                                  Services,
                                                            /organism="Rhodotorula graminis"
|mol_type="unassigned DNA"
|db_xref="taxon:29898"
| 37.__.2199
/codon_start=1
/protein_id="CAD23828.1"
/db_xref="GI:18698150"
/db_xref="REMTREMBL:CAD23828"
                                                                                                                     Location/Qualifiers
                                               note="unnamed
                                                                                                                                                                                                                                                                                                                                                                               2419
                                                                                                                                                                                                                                                                                                                                                                                                      2408
                                                                                                                                                                                                                                                                                                       from
                                                                                                            .2419
                                                                                                                                                                                                                                                                                 GI:18698149
                                                                                                                                  Inc. (US)
                                                                                                                                                                                                                                                                                                       Patent
                                                                                                                                                                                                                                                                                                       2419 bp
WO0208402.
                                               protein product"
                                                                                                                                                                                                                                                                                                                  DNA
                                                                                                                                                                                                                                                                                                                    linear
                                                                                                                                                                                                                    Sporidiobolales;
                                                                                                                                                                                                                                                                                                                    PAT
                                                                                                                                                                                                                                                                                                                    15-FEB-2002
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1993
                                                                                                                                                                                                                                                                                                                                                                                                                                                     2400
                                                                                                                                                                                                                                                                                                                                                                                                                                                                             2352
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    2340
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           2292
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   2280
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  2220
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           2173
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  2160
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                2100
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         2053
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                2040
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1980
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1933
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1920
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           2232
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         2113
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1875
                                Š
                                                                             Š
                                                                                                         밁
                                                                                                                           8
                                                                                                                                                        В
                                                                                                                                                                              δ
                                                                                                                                                                                                                            S
                                                                                                                                                                                                                                                      B
                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                           Ś
                                                                                                                                                                                                                                                                                                                                                                        Ś
                                                                                                                                                                                                                                                                                                                                                                                                      밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
              В
                                                           뮍
                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                        . 8
                                                                                                                                                                                                                                                                                                                                                      밁
                                                                                                                                                                                                                                                                                                                                                                                                                         $
                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ORIGIN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Matches 1878;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Query Match
Best Local
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          unsure
                                                            691
                                                                                  661
                                                                                                           631
                                                                                                                                  601
                                                                                                                                                          571
                                                                                                                                                                                 541
                                                                                                                                                                                                         511
                                                                                                                                                                                                                                481
                                                                                                                                                                                                                                                        451
                                                                                                                                                                                                                                                                                                       391
                                                                                                                                                                                                                                                                                                                                                        331
                                                                                                                                                                                                                                                                                                                                                                                                       272
                                                                                                                                                                                                                                                                                                                                                                                                                                                      215
              751
                                    721
                                                                                                                                                                                                                                                                                421
                                                                                                                                                                                                                                                                                                                               361
                                                                                                                                                                                                                                                                                                                                                                              301
                                                                                                                                                                                                                                                                                                                                                                                                                             241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                             181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      155
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   97
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    37
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Н
                                                                            GGCGACCTCTCCCCCCTCTCNTACATCGCCGCCGCCATCACCGGTCACCCGGACNNCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                      TCGGCGCCGCNCGCAAGGGCCGCNCNGTCCGCGTCNCAGACAGNCGACGAGATCCGCGCA
               GTTCACGTTTTGCACGAGGAACCGAGAAGATCATGTTTGCGCGCGAGGCCATCTCGCTC
                                     GTNCACGTNNTNCACGAGGGCANNGAGAAGATCATGTNCGCCCGCGAGGCGATCGCGCTC
                                                                                                            AACTTCTTGAACCACCGCATCACGCCCATCGTCCCCCCCGCGGCTCCATCTCGGCGTCG
                                                                                                                                                                                                                                                                                                                                                      CGCGTCGACAAGAGCGTCGACTTCCTCAAGGCCCAGCTTCAGAACTCGGTCTACGGAGTC
                                                                                                                                                                                                                                                                                                                                                                               AAGATCGACAANAGNGTCGAGTTCCTCCGNNCNCAGCTCNACAACAGNGTCTACGGNGTC
                                                             GGCGACCTCAGCCCGCTCTCGTACATCGCCGGCGCCATCACCGGTCACCCCGACGTCAAG
                                                                                                                                                                                                                                                                                                                                                                                                         TCGGCGCCGCCAAGGGGCGCAGGGTCCGCGTC-
```

/note="Other information:

Xaa =

Val or

Similarity ACCCCACCGAC---GACGTCGTCGAGCTCAGCGGTTACAGCCTCACCGTCCGTGACGTTG ACCCCACCGNNACGNACGNNNTCGAACTCGACGGGTACACCCTCACCCTCGGNGACGTCG GCCTCGATGGCCACGCCGCACCAGTCGCAGCTCGAGATCGTGCAGGAGCTCCTCAGCG CACGCCGNNCCGNCNNNGNCGNCNACGGGCGCCACGTCCACNCTCNGNCGGCCGNCGCNG ATGGCCCCTTCCTTGGACTCGCTCGCCACCACCCTCGCCAACGGCTTTACCAACGGCTCG ATGGCCCCCTCCNTCGACTCGATCGCGAACCGCTCGNTCGCCAACGGCNTCNCNAACGGNTNG CACGCCGCTCCGACCAAGTCGGCTGCGGGCCCCACTTCGGCTCTCCGCCGCACGC--CCG Conservative 65.8%; 78.0%; Score 1629; DB 6; Pred. No. 2.5e-169; 1; Mismatches 504; Length Indels 2419; 25; Gaps 271 240 214 180 154 120 96 60 œ

AACTTCCTCAACCACGGCATCACCCCCATCGTCCCCCCTCCGCGGCACCATCTCGGCGTCG GGNCGCGGCCTCGAGAACTCGCCTTCCGCTCGAGGTCCTCCGCGGCGCCCATGACCATCCGC GCNCTCCTCGAGCACCAGCTCTGCGGTGTNCTCCCNACGTCGNTCGANTCCTTCNGCCTC erchaerederedeceaeredeceredeceredeceredeceredeceredeceredece GTCAACTCGCTCACNCGCGGCCACTCGGCNGTCCGCCTCGTCGTCCTCGAGGCGCTCACC GGACGCGGCCTCGAGAACACGCTTCCGCTCGAGGTCGTCCGCGGCGCCCATGGTCATCCGC GCGCTCATCGAGCACCAGCTCTGCGGCGTGACGCCGACGTCCGYCTCGTCCTTCAGCGTC ACCACGGGTTTCGGTGGCTCGGCCGACACGAGGACTGAGGATGCAGTCAGCCTCCAGAAG ACGACTGGTTTCGGCCGGCCCGACACCCCGGACTGAGGATGCNATCTCGCTCCAGAAG

600

570 540 510 480 450 420 390 360 330 300

```
1441
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1408
                                       1816
                                                                            1801
                                                                                                                   1756
                                                                                                                                                        1741
                                                                                                                                                                                                 1708
                                                                                                                                                                                                                                                                            1648
                                                                                                                                                                                                                                                                                                                 1621
                                                                                                                                                                                                                                                                                                                                                        1588
                                                                                                                                                                                                                                                                                                                                                                                             1561
                                                                                                                                                                                                                                                                                                                                                                                                                                  1528
                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1501
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1468
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1381
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1348
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1321
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1288
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1261
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1228
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1201
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1171
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1141
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1111
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1081
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1051
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1021
                                                                                                                                                                                                                                    1681
1861
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             991
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                961
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       931
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 871
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              811
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            901
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        841
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 781
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GGCAAGCTCAACTTCACGCAGCTCACCGAGATGCTCAACGCCGGCATGAACCGCGGCCTN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   GGCCCGCTCGTCAGCGACATGATTCACGCCCCACGCNGTCCTCTCGCTCGAGGCCGGNCAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CONTTCCTCCACGACGTCACGCCCTCACCCGACCCGAGATCGAGGTCGCGCGCAACATC
NNGTCCTCGCCNNNNGCCANNAGGTCTCGCTCGCNGCCGTCAACGCCTGGAAGGTCGCCT
                                                                                                                                                                                                                                                                                                                                                                                 ACNGCCGAGGCCAACGTCCTTTTCTCTCCTCCTCCTCGCCACCCTCTACTGCGTNCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CAGCCGGCNGAGATGGGCAACCAGGCCGTCAACTCGCTCGCNCTCATCTCGGCNCGCCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CACATCGCTGCTTACGCTTCGGAGCTCGGCCACCTTGCCAACCCGGTCACTTCGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GCCGCNGCNGCNTACACTTCGGAGCTCGGNCACCTTGCCAACCCCGGTNACGACCCACGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   CCNTCCTGCCTCGCTGCCGAGGACCCNTCGCTCTCTCTATCACTGCAAGGGCCTCGACATT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GCCAAGCTCAACTTCACGCAGTGCACCGAGTTGCTCAACGCTGCCATGAACCGCGGCCTG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 TCGACGACCGACAACCCGCTCATCGACGTCGAGAACAAGANGACCCACCACGGCGGCAAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    GACGACGAGGGCATTCTTCGCCAGGACCGCTACCCGCTCCGCACGTCGCCTCAGTTCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               GACGACGAGGGCATTCTCCGCCAGGACCGCTACCCGCTCGCCCCCAGTGGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              TCGCAGGCGCTCACGGCTCTNACGGTCGAGGCCATGGTCGGCCACGCCGGCTCGTTCCAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 GCCGTCTCCGCCTCGATGGCGACCCTCAGTCTGCACGACTCGCACATGCTCTCGCTCCTC
                                       CTCGAGCCGCGCTGGCACGACGCCTTCTCGTACGCGACCGGCACCGTCGTCGAGCTCCTC
                                                                        CTCGAGCCGCGCTGGCACGACGCCTTCTCGTTCGCGACCGGCACCGTCGTCGAGNNNNNN
                                                                                                                   CTTGCGCTCGAGGTCAAGAAGGCGCTCAACAAGCGTCTCGAGCAGAAGGACGACGTACGAC
                                                                                                                                                        CTCGNGGACAAGGTCAACAAGNCGCTCNACAAGCGNCTCGAGCAGACCAACTCGTACGAC 1800
                                                                                                                                                                                                                                    CAGGCCGTCGACCTCCGCGCGATGGAGCTCGACTTCAAGAAGCAGTTCGACCCGCTTCTC
                                                                                                                                                                                                                                                                                                               CAGGCCGTCGACCTCCGCGCGATGGAGTTCGAGTTCAAGAAGCAGTTCGACCCGNTNNTC
                                                                                                                                                                                                                                                                                                                                                        ACTGCCGAGGCCAACGACGTCCTTTCTCTCTCTCGCCTCGCACCTGTACTGCACGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                  CCTTCGTGCCTCGCTGCCGAGGACCCGTCGCTCAACTATCACGGCAAGGGCTTGGACATT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 TTCCAGGCGTCGGCTGTCTCGATTTCGATGGAGAAGACCAGGCTCGCACTCGCCCTCATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      CGCACGCTCCTTTCCGGCTCGTCGTTTGCCGTTGAGCACGAGGAGGAGGTCAAGGTCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      CGCACGCTCCTCGAGGGCAGCNNGTTTGCCGTCCACCACGAGGAGGAGGTCAAGGTCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             CCGTTCATCCACGACGTCTGCCGCCCGCACCCCGGCCAGGTCGAGGTCGCGCGCAACATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       TCGCAGGCCTTGACGGCTCTCACGGTGGAGGCCATGGTCGGCCAGCAGGGCTCGTTCGCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    GCCGTCTCCGCCTCGATGGCGACCCTCGCTCTGCACGACGCACACATGCTCTCGCTCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           TTTGGTCTCGAGGCAGTCGTCCTCGGCCCGAAGGAGGGTCTCGGTCTGGTCAACGGAACG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    TINGGTCTCGAGCCCGTCGTCCTCGGCCCGAAGGAGGTCTCGGTCTCGTCAACGGCACG
                                                                                                                                                                                                                                                                                                                 1680
                                                                                                                                                                                                                                                                                                                                                        1647
                                                                                                                                                                                                                                                                                                                                                                                             1620
                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1560
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1500
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1440
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1380
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1320
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1227
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1140
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1080
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1020
                                                                            1860
                                                                                                                   1815
                                                                                                                                                                                                                                                                            1707
                                                                                                                                                                                                                                                                                                                                                                                                                                  1587
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1467
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1407
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1347
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1260
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1200
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1170
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1110
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1050
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1287
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 930
                                         1875
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1527
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            960
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      900
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              870
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       990
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 840
```

성 유 성

Ś В Š B Ś 밁 Ş 멁 Ś 밁 Ś В Ś В Š В Ś D D Š Дb δÃ В S B Ş 밁 Ş 멍 Ś B Ş 밁 Ś

Вþ

```
VERSION
KEYWORDS
SOURCE
ORGANISM
                                                                                                                                                                                                                                                                                                                                                                                                                                                                              DEFINITION
ACCESSION
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             RESULT
E01759
LOCUS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     맑
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          DЬ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            망
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      . 5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                          COMMENT
                                                                                                                                                                                                                                                                                                                                                            REFERENCE
                                                                                                                                                                                                                                                                                                             TITLE
                                                                                                                                                                                                                                                                                                                                           AUTHORS
                                                                                                                                                                                                                                                         JOURNAL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 11
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   2412
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   2401
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    2353
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    2341
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      2293
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      2281
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      2233
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         2221
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           2174
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           2161
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           2114
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             2101
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            2054
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              2041
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1994
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1981
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1934
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1876
                                                                                                                                                 MITSUI TOATSU CHEM INC
OS Rhodosporidium toru
PN JP 198291583-A/1
PD 29-NOV-1988
PF 22-NAY-1987 JP 1987
PI FUKUHARA NOBUHIRO,
                                                                                                                                                                                                                                                     Fukuhara, N., Yoshino, S., Yamamoto, K., Nakajima, Y., Iwata, T., Watanabe, M., Suzuki, M. and Makiguchi, N. AMONIA LYASE, ITS AMINO ACID SEQUENCE OF L-PHENYLALANINE AMMONIA LYASE, ITS STRUCTURAL GENE, NOVEL BASE SEQUENCE CONTAINING SAME, TRANSFORM PRODUCED THEREWITH AND PRODUCTION OF L-PHENYLALANINE USING SAME PATENT: JP 1988291583 A 1 29-NOV-1988;
                                                                                                                                                                                                                                                                                                                                                        Rhodosporidium toruloides
Rhodosporidium toruloides
Endacyota; Urediniomycetes;
Eukaryota; Fungi; Basidiomycota; Urediniomycetes;
Microbotrycmycetidae; Sporidiobolales; Rhodosporidium.
1 (bases 1 to 2151)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              E01759
PC C12N9/88,C12N1/16,C12N1/18,C12N1
(C12P13/22,
PC C12R1:19),(C12P13/22,C12R1:865);
CC strandedness: Double;
CC topology: Linear;
CC hypothetical: No;
                                                                                                                  PI FUKUHARA NOBUHIRO,
NAKAJIMA YOSHIYUKI,
PI IWATA TOMOYUKI, WA
                                                                                                                                                                                                                                                                                                                                                                                                                                              JP 1988291583-A/1.
                                                                                                                                                                                                                                                                                                                                                                                                                                                            E01759
E01759.1 GI:2170012
                                                                                                  NOBUYOSHI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               TCGTCCTCGCCCTCTGCCA--ACGTCACCCTTACTGCCGTCAACGCGTGGAAGGTTGCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   AAAAAAAA 2419
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   NNNANAAA 2408
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      NGTINNICANNIA CNCNTINNINNINANI CNGGNANIGANTINANGINI TIN CGNGNI CININNIN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      ACCCCAAGACCAGCTTTTCGACGTCGTGTCGTGCCAAGAACGGACTTTCCTCCATACACA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     NNNCCNNNNNNNCTNTTNGNNNTCGNNTCNTGNCNNNNNCGGANNTNNCNNCNNNNNNN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ccgccgagaaggccarcrcgcrcacgcgcnangrccgcgacnccrrcrgancggcnccgr
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GGTCGTCA-GTACACGTGTATAGÁGCCTGGAÁTGGÁTTGCAAGTCTTCGAGTTCAAAAAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           ACGTCCTCGTCAAGATGCTCGCGTA-AGGCCCGAGCAAGCCTCGCCTAGACGCCCGCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         ACGTCCTCGTCAAGATGCTCGCNTAGNNNCNCNNNCNANNCTCGCNTNNNNNCCNNNCNC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             AGACGATCGGGAGCAACGTCTCGCGCATCTACGAGGCCATCAAGGACGGCCGCATCAACC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          TGACGATCGGCACCAACGTCTCCCGCATCTACGAGGCCATCAAGNNCGGCNGCATCAACC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              TGCGCGAGGAGCTCGGCGTGCAGGCGCGCGCGACGTGTTTGTCGGCGTGCAGCAGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              cercercercecececnical accircecececececececercereracicerrece
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 CGGCCGAGAAGGCCATCTCGCTCACGCGCGAGGTGCGCAACCGCTTCTGGCAGACGCCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      TGTCGCCTTACTCTCGCCGTCATCACGTCTCTCAGTTCTTTCGTATCCCGCGTCTCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      THNINCHTHNCTHNCTCHCHNINAACHNGTCHNTHNINCHNHGHNTHNINNHNINCHNIC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              encoding L-phenylanine
                                                                                                                           29-NOV-1988
22-MAY-1987 JP 1987123950
22-MAY-1987 JP 1987123950
AMAMOTO KAORU,
                                                                                                                                                                                                       Rhodosporidium toruloides JP 1988291583-A/1
                                                                                  C12N9/88, C12N1/16, C12N1/18, C12N1/20, C12N15/00, C12P13/22,
                                                                                                                    WATANABE MIDORI, SUZUKI MAKI,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               2151
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                anmonia-lyase
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               đď
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                RNA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                linear
                                                                                                                      ΡH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  PAT
                                                                                                                                                                                                                                                                                               TRANSFORMANT
                                                                                                                      MAKIGUCHI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  29-SEP-1997
                                                                                      PC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1980
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     2411
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      2400
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        2340
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        2292
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           2220
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             2160
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                2053
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1933
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         2280
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           2232
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           2173
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              2113
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              2100
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                2040
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1993
```

```
Å
A
                                                                                                                                                 5
                                                                                                                                                                           Ъ
  õ
                           В
                                            8
                                                                       뮍
                                                                                                                                                                                                     5
                                                                                                                                                                                                                             유 왕
                                                                                                                                                                                                                                                                                Ъ
                                                                                                                                                                                                                                                                                                         δ
                                                                                                                                                                                                                                                                                                                                         멍
                                                                                                                                                                                                                                                                                                                                                            8
                                                                                                                                                                                                                                                                                                                                                                                      ДD
                                                                                                                                                                                                                                                                                                                                                                                                                  8
                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Вb
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  ORIGIN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                FEATURES
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Best Local Similarity Matches 1829; Conserv
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Query Match
Best Local
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    source
                             697
                                                                              637
                                                                                                       661
                                                                                                                                 577
                                                                                                                                                          109
                                                                                                                                                                                   517
                                                                                                                                                                                                            541
                                                                                                                                                                                                                                      457
                                                                                                                                                                                                                                                              481
                                                                                                                                                                                                                                                                                        397
                                                                                                                                                                                                                                                                                                                 421
    781
                                                   721
                                                                                                                                                                                                                                                                                                                                          337
                                                                                                                                                                                                                                                                                                                                                                    361
                                                                                                                                                                                                                                                                                                                                                                                              277
                                                                                                                                                                                                                                                                                                                                                                                                                      301
                                                                                                                                                                                                                                                                                                                                                                                                                                                  218
                                                                                                                                                                                                                                                                                                                                                                                                                                                                         241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   161
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     101
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 19
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1 ATGGCCCCCTCCNTCGACTCGATCGCGACCTCGNTCGCCAACGGCNTCNCNAACGGNTNG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          ы
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           mat_peptide
FT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    SSSEE
                                                                                               GGCGACCTCTCCCCCNCTCTCNTACATCGCCGCCGCCATCACCGGTCACCCGGACNNCAAG
                                                                                                                                                                                                                                                                                                             GCNCTCCTCGAGCACCAGCTCTGCGGTGTNCTCCCNACGTCGNTCGANTCCTTCNGCCTC
                                                 GINCACGINNINCACGAGGGCANNGAGAAGATCATGINCGCCCGCGAGGCGATCGCGCTC
                                                                                                                                                 AACTTCCTCAACCACGGCATCACCCCCATCGTCCCCCTCCGCGGGCACCATCTCGGCGTCG
                                                                                                                                                                                     GTCAACAGCTTGACCCGCGGCCACTCGGCTGTCCGCCTCGTCGTCGAGGCGCTCACC
                                                                                                                                                                                                                                     GCCGCGGTCTCGAGAACTCGCTTCCCCTCGAGGTTGTTCGCCGCGCCATGACAATCCGC
                                                                                                                                                                                                                                                              GGNCGCGGCCTCGAGAACTCGCTTCCGCTCGAGGTCGTCCGCGGCGCCATGACCATCCGC 540
                                                                                                                                                                                                                                                                                                                                                                                                                   AAGATCGACAANAGNGTCGAGTTCCTCCGNNCNCAGCTCNACAACAGNGTCTACGGNGTC 360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ACCCCACCGNNACGNNNTCGAACTCGACGGGTACACCCTCACCCTCGGNGACGTCG
    {	t TTNGGTCTCGAGCCCGTCGTCCTCGGCCCGAAGGAGGGTCTCGGTCTCGTCAACGGCACG}
                             GTGCACGTCGTCCACGAGGGCAAGGAGAAGATCCTGTACGCCCGCGAGGCGATGGCGCTC
                                                                                GGCGACCTCTCTCTCTCTACATTGCAGCGGCCATCAGCGGTCACCCGGACAGCAAG
                                                                                                                                 AACTTCCTCAACCACGGCATCACCCCCATCGTCCCCCTCCGCGGCACCATCTCTGCGTCG
                                                                                                                                                                                                           GTCAACTCGCTCACNCGCGGCCACTCGGCNGTCCGCCTCGTCGTCCTCGAGGCGCTCACC
                                                                                                                                                                                                                                                                                          GCTCTCCTCGAGCACCAGCTCTGCGGTGTTCTCCCTTCGTCGTTCGACTCGTTCCGCCTC
                                                                                                                                                                                                                                                                                                                                             ACGACTGGATTTGGCGGATCCGCAGACACCCGCACCGAGGACGCCATCTCGCTCCAGAAG
                                                                                                                                                                                                                                                                                                                                                             ACGACTGGTTTCGGCGGCTCGGCCGACACCCCGGACTGAGGATGCNATCTCGCTCCAGAAG
                                                                                                                                                                                                                                                                                                                                                                                              AAGATTGACAAATCGGTCGAGTTCTTGCGCTCGCAACTCTCCATGAGCGTCTACGGCGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                TOTOGGOGGGAGGAAGGGCAGGCCTGTCCGCGTCAAGGACAG-CGACGAGATCCGCTCA
                                                                                                                                                                                                                                                                                                                                                                                                                                                               TCGGCGCCGCNCGCAAGGGCCGCNCNGTCCCGCGTCNCAGACAGNCGACGAGATCCGCGCAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   CGCCGACCGACTCGA---CGCTCGAACTCGACGGCTACTCGCTCAACCTCGGAGACGTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GCTCGCACCTGCCCACAACCCAGGTCACGCAGGTCGACATCGTCGAGAAGATGCTCGCCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           GCTCGCTCCCGACCACCCAGNNGACGCAGCTCGACATCGTNGAGNAGATCCTCGCCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CAGGCTGT-----GCAGTCGCAGCCAACCTC----GCAGTCGCAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CACGCCGNNCCGNCNNNGNCGNCNACGGGGGGCCACGTCCACNCTCNGNCGGCCGNCGCNG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           ATGGCACCCTCGCTCGACTCGATCTCGCACTCGTTCGCAAACGGCGTCGCATCCGCAAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             anti-sense: No;
*source: strain=IFO 559;
*source: clone=pSWI01;
*source: clone_tocation/Qualifiers
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              /product='L-phenylanine anmonia-lyase'
Location/Qualifiers
1...2151
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          /organism="Rhodosporidium
/mol_type="genomic RNA"
/db_xref="taxon:5286"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        65.7%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      /product='L-phenylananine anmonia-lyase'
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             0
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Score 1626.4; DB 6;
Pred. No. 5e-169;
0; Mismatches 322;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   .2151
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      toruloides
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      6
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             35;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       2151;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     H
                                                 780
                                                                                696
                                                                                                       720
                                                                                                                                636
                                                                                                                                                         660
                                                                                                                                                                                   576
                                                                                                                                                                                                            600
                                                                                                                                                                                                                                     516
                                                                                                                                                                                                                                                                                        456
                                                                                                                                                                                                                                                                                                                  480
                                                                                                                                                                                                                                                                                                                                           396
                                                                                                                                                                                                                                                                                                                                                                    420
                                                                                                                                                                                                                                                                                                                                                                                              336
                                                                                                                                                                                                                                                                                                                                                                                                                                                276
                                                                                                                                                                                                                                                                                                                                                                                                                                                                        300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  217
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              180
                             756
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    160
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        100
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                120
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    60
               Ş
                                      멍
                                                           Ś
                                                                                           밁
                                                                                                             5
                                                                                                                                      Ъ
                                                                                                                                                                8
                                                                                                                                                                                              뫄
                                                                                                                                                                                                                  Ş
                                                                                                                                                                                                                                                 ₽
                                                                                                                                                                                                                                                                      δ
                                                                                                                                                                                                                                                                                                  B
                                                                                                                                                                                                                                                                                                                           Ş
                                                                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                                                          Ş
                                                                                                                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                                                                                                             Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                               δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   δÃ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                멍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      맑
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        . 명
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   片
                                         1777
                                                                                                                                                                                                                                                                                                                                                      1417
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1177
                                                                                            1717
                                                                                                                     1741
                                                                                                                                              1657
                                                                                                                                                                                                                         1621
                                                                                                                                                                                                                                                   1537
                                                                                                                                                                                                                                                                                                     1477
                                                                                                                                                                                                                                                                                                                                                                                 1441
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1117
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1141
                1861
                                                                1801
                                                                                                                                                                                                                                                                            1561
                                                                                                                                                                                                                                                                                                                             1501
                                                                                                                                                                                                                                                                                                                                                                                                          1357
                                                                                                                                                                                                                                                                                                                                                                                                                                                             1297
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1321
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1237
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1261
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1057
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1021
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1081
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          997
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             937
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      961
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                877
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         901
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  817
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           841
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   757
NNGTCCTCGCCNNNNGCCANNAGGTCTCGCTCGCNGCCGTCAACGCCTGGAAGGTCGCCT
                                        CTCGTCCCGCGCTGGCACGACGCCTTCTCCTTCGCCGCCACCGTCGTCGACGTCCTC
                                                                                                         CTCGNGGACAAGGTCAACAAGNCGCTCNACAAGCGNCTCGAGCAGACCAACTCGTACGAC
                                                                                                                                                                                                                                                                  CAGCCGGCNGAGATGGGCAACCAGGCCGTCAACTCGCTCATCTCGGCNCGCCGC
                                                                                                                                                                                                                                                                                                                                                                          GCCGCNGCNGCACACTTCGGAGCTCGGNCACCTTGCCAACCCGGTNACGACCCACGTC
                                                                                                                                                                                                                                                                                                                                                                                                                       CONTOCTGCCTGGCTGCCGAGGACCONTCGCTCTCCTATCACTGCAAGGGCCTCGACATT
                                                       CTCGAGCCGCGCTCGCACGACGCCTTCTCGTTCGCGACCGGCACCGTCGTCGAGNNNNNN
                                                                                            CTCGTCGAGAAGGTGAACAAGACGCTCGCCAAGCGCCTCGAGCAGACCAACTCGTACGAC
                                                                                                                                              GTCTCGCTCATCGACCAGCACTTTGGCTCCGCCATGACCGGCTCGAACCTGCGCGACGAG
                                                                                                                                                                     CAGGCCGTCGACCTCCGCGCGATGGAGTTCGAGTTCAAGAAGCAGTTCGACCCGNTNNTC
                                                                                                                                                                                                                                                                                                      CAGCCGGCTGAGATGGCGAACCAGGCGGTCAACTCGCTTGCGCTCATCTCGGCTCGTCGC
                                                                                                                                                                                                                                                                                                                                                        ĠĊĊĠĊŦĠĊĠĠĊĠŦĂĊĂĊĊŦĊĠĠĂĠŦŦĠĠĠĂĊĂĊĊĬĊĠĊĊĂĂĊĊĊŦĠŤĠĂĊĠĀĊĠĊĂŦĠŤĊ
                                                                                                                                                                                                                                                                                                                                                                                                          CCCTCCTGCCTCGCGAAGACCCCTCGCTCTCCTACCACTGCAAGGGCCTCGACATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                            GGCAAGCTCAACTTCACGCAGCTCACCGAGATGCTCAACGCCGGCATGAACCGCGGGCCTN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GGCCCGCTCGTCAGCGACATGATTCACGCCCACGCNGTCCTCTCGCTCGAGGCCGGNCAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              TCGCAGGCGCTCACGGCTCTNACGGTCGAGGCCATGGTCGGCCACGCCGGCTCGTTCCAC
                                                                                                                                                                                                 CAAGCCATCGACTTGCGCGAGTCGAGTTCGAGTTCAAGAAGCAGTTCGGCCCAGCCATC
                                                                                                                                                                                                                                                    GGCAAGCTCAACTTCACGCAGCTCACCGAGATGCTCAACGCCGGCATGAACCGCGGCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 TTCCAGGCTGCCGCTGTGGCCAACACCATGGAGAAGACTCGCCTCGGGCTCGCCCAGATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   TCGACGACCGACACCCTCTCATCGACGTCGAGAACAAGACTTCGCACCACGGCGGCAAT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            TCGACGACCGACAACCCGCTCATCGACGTCGAGAACAAGANGACCCACCACGGCGCAAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   GACGACGAGGCATTCTCCGCCAGGACCGCTACCCCTTGCGCACGTCTCCTCAGTGGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       GACGACGAGGGCATTCTCCGCCAGGACCGCTACCCGCTCCGCACGTCGCCTCAGTGGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CGCACGCTCCTCGAGGGCAGCNNGTTTGCCGTCCACCACGAGGAGGAGGAGGTCAAGGTCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             CCCTTCCTTCACGACGTCACGCGCCCTCACCCGACGCAGATCGAAGTCGCGGGAAACATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CONTTCCTCCACGACGTCACGCGCCCTCACCCGACCCAGATCGAGGTCGCGCGCAACATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GCCGTCTCAGCATCGATGGCCACCCTCGCTCTGCACGACGCACACATGCTCTCGCTCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    GCCGTCTCCGCTCGATGGCGACCCTCCGCTCTGCACGACGCACACATGCTCTCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   TTCAACCTCGAGCCCGTCGTCCTCGGCCCGAAGGAAGGTCTCGGTCTCGTCAACGGCACC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           cecaaecrocrocaeeaaecocririecrorocacoareaeeaeeaecaaecroaae
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                TOGCAGTOGOTOACGGCCATGACGGTCGAAGCGATGGTCGGCCACGCCGGCTCGTTCCAC
                                                                                                                      1800
                                                                                                                                              1716
                                                                                                                                                                                                 1656
                                                                                                                                                                                                                          1680
                                                                                                                                                                                                                                                                            1620
                                                                                                                                                                                                                                                                                                      1536
                                                                                                                                                                                                                                                                                                                                                                                  1500
                                                                                                                                                                                                                                                                                                                                                                                                           1416
                                                                                                                                                                                                                                                                                                                                                                                                                                     1440
                                                                                                                                                                                                                                                                                                                                                                                                                                                              1356
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1380
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1296
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1320
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1236
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1260
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1200
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1116
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1140
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1056
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1080
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1020
                                                                                                                                                                                                                                                    1596
                                                                                                                                                                                                                                                                                                                                1560
                                                                                                                                                                                                                                                                                                                                                         1476
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1176
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   876
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     816
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              996
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                936
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         960
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            900
```

	40 A5 40 A5 A5 A5 A5 A5 A5 A5 A5 A5 A5 A5 A5 A5	P & &	Matches 1829  Qy  1  Db  1	ORIGIN Query M	FEATURES source	REFERENCE AUTHORS TITLE JOURNAL	SOURCE ORGANISM	DEFINITION ACCESSION VERSION	RESULT 12 AR205032	B &	g Q	Qy Db	QY Db	Qy Db	Db
241 TCGGCCGCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC	181 ACCCCACCGACTCGACGCTCGAACTCGACGGCTACTCGACCTCGGAGAAGACGTCG 217	CACGCCGNNCCGNCNNNGNCGNCNACGGGCGCACGTCCACNCTCNGNCGGCCGNCGCNG	1829; Conservative 0; Mismatches 32; Indels 35; Gaps 5;  1879; Conservative 0; Mismatches 32; Indels 35; Gaps 5;  1 ATGGCCCCCTCCNTCGACTCGACCGGGCACCTCGCCAACGGCNTCNCNAACGGNTNG 60	65.7%;	ce Location/Qualifiers 1. 2151 /organism="unknown" /mol type="unassigned DNA"	Unclassified.  1 (bases 1 to 2151) 1 (bases 1 to 2151) Gatenby, A.A., Sariaslani, S., Tang, XS., Qi, W. Wei. and Vannelli, T. Bioproduction of para-hydroxycinnamic acid Patent: US 6368837-A 9 09-APR-2002;	. Unknown. Unknown.	N Sequence 9 from patent US 6368837.  AR205032  AR205032.1 GI:21502510		2161 ACGTCCTCGTCAAGATGCTCGCNTAG 2186	2101 TGACGATCGGCACCAACGTCTCCCGCATCTACGAGGCCATCAAGNNCGGCNGCATCAACC 2160	2041 TCCGCGAGGAGCTCGGCGTCAAGGCCCGCCGCGGCGACGTCTTCCTCGGCAAGCAGGAGG 2100	1981 CGTCGTCGTCGCCGCGCTCNCGTACCTCTCGCCGCGCACGCGCGCTCCTGTACTCGTTCG 2040	1921 CCGCCGAGAAGGCCATCTCGCTCACGCGCNANGTCCGCGACNCCTTCTGGNCGGCNCCGT 1980	1837 TCGTCGACGTCGCTCTCGCTCGCCGCCGTCAACGCCTGGAAGGTCGCCG 1885
-															
2 2 2 2 2	, עס אם מם	δ g δ	. B & B	7 Q (	당 성	5 5 P	7 Q	9 6	Db dQ	п о	п о		п О	п о	뮰
					8 4 6	5 4 0	•	0 1	•	Db Qy	Db Qy	Qy Db	Db VQ	Qy Db	

35;

-GCAGTCGCAG

9 60 G

```
JOURNAL FEATURES
                                                                                                                                                                                    REFERENCE
AUTHORS
TITLE
                                                                                                                                                                                                                                                                                                  VERSION
KEYWORDS
                                                                                                                                                                                                                                                                                                                                       LOCUS
DEFINITION
ACCESSION
                                                                                                                                                                                                                                                                                                                                                                                             RESULT 13
AR282639
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                유
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           음 성 음
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         경 음 성
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               дb
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ఠ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  g
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        55
B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       유양
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             뫄
                                                                                                                                                                                                                                                                                    SOURCE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ś
 Query Match
Best Local
                                                                                                                                                                                                                                                              ORGANISM
                                                                                                                                                                                                                                                                                                                                                                                                                                                                      2126
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          2161
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                2066
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    2101
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         2006
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1946
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1981
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1886
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1921
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1777
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1801
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1741
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           2041
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1837
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1717
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1657
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1681
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1597
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1537
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1477
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1861
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1621
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1561
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1501
                                                                                                                                                                                                                                                                                                                 AR282639
Sequence 9 f
AR282639
AR282639.1
                                                                                                                                                                                  1 (bases 1 to 2151)
Tang, X.-S.
Polynucleotide encoding
                                                                                                                     rolynucleotide encoding a mutant Rh ammonia lyase polypeptide Patent: US 6531748-A 9 18-FEB-2003; Location/Qualifiers
                                                                                                                                                                                                                                            Unknown.
Unclassified.
                                                                                                                                                                                                                                                                                  Unknown
 Similarity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CAGCCGGCNGAGATGGGCAACCAGGCCGTCAACTCGCTCGCCNCTCATCTCGGCNCGCCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                    ACGTCCTCAAGATGCTCGCTTAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            ACGTCCTCGTCAAGATGCTCGCNTAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      TGACGATCGGCACCAACGTCTCCCGCATCTACGAGGCCATCAAGNNCGGCNGCATCAACC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CGTCGTCGTCGCCGCGCGCTCNCGTACCTCTCGCCGCGCGCACGCGCGTCCTGTACTCGTTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CCGCCGAGAAGGCCATCTCGCTCACGCGCNANGTCCGCGACNCCTTCTGGNCGGCNCCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          NNGTCCTCGCCNNNNGCCANNAGGTCTCGCTCGCNGCCGTCAACGCCTGGAAGGTCGCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 CTCGAGCCGCGCTGGCACGACGCCTTCTCGTTCGCGACCGGCACCGTCGTCGAGNNNNNN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CTCGNGGACAAGGTCAACAAGNCGCTCNACAAGCGNCTCGAGCAGACCAACTCGTACGAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CAGGCCGTCGACCTCCGCGCGATGGAGTTCGAGTTCAAGAAGCAGTTCGACCCGNTNNTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   TGACGATCGGCTCGAACGTCTCCAAGATCTACGAGGCCATCAAGTCGGGCAGGATCAACA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 CCGCCGAGTCGGCCATCTCGCTCACCCGCCAAGTCCGCGAGACCTTCTGGTCCGCCGCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CTCGTCCCGCGCTGGCACGACGCCTTCTCCTTCGCCGCCGGCACCGTCGTCGAGGTCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CTCGTCGAGAAGGTGAACAAGACGCTCGCCAAGCGCCTCGAGCAGCAACTCGTACGAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GTCTCGCTCATCGACCAGCACTTTGGCTCCGCCATGACCGGCTCGAACCTGCGCGACGAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CAAGCCATCGACTTGCGCGCGACCGAGTTCGAGTTCAAGAAGCAGTTCGGCCCAGCCATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               /organism="unknown"
/mol_type="genomic
                                                                                                                                                                                                                                                                                                                                                         from
                                                                                                                                                                                                                                                                                                                     GI:29719238
65.7%;
83.7%;
                                                                                                                                                                                                                                                                                                                                                       2151 bp
patent US 6521748
Score 1626.4; DB Pred. No. 5e-169;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    -GCTCTCGCTCGCCGCCGTCAACGCCTGGAAGGTCGCCG
                                                                                                                                                                                      mutant Rhodotorula
                                                                           DNA"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          2186
                                                                                                                                                                                                                                                                                                                                                                                                                                                                      2151
                                                                                                                                                                                                                                                                                                                                                                           DNA
                 9
                                                                                                                                                                                                                                                                                                                                                                             linear
               Length
                                                                                                                                                                                      glutinis tyrosine
                                                                                                                                                                                                                                                                                                                                                                             PAT
                                                                                                                                                                                                                                                                                                                                                                             10-APR-2003
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    2160
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1945
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1980
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1885
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1920
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1860
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1800
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1740
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  2125
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           2100
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 2005
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     2040
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1836
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1776
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1680
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1620
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1536
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1560
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         2065
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1656
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1596
                             8
                                                                                                   Ş
                                                                                                                                                 В
                                                                                                                                                                                                              Ď,
                                                                                                                                                                                                                                                                                                                           Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                             В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  문
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           8
 밁
                                                                       B
                                                                                                                                                                            Ş
                                                                                                                                                                                                                                                      5
                                                                                                                                                                                                                                                                                                    日
                                                                                                                                                                                                                                                                                                                                                                         В
                                                                                                                                                                                                                                                                                                                                                                                                     Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     뭐
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       멍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          망
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Matches 1829;
                                     1021
 997
                                                                         937
                                                                                                           961
                                                                                                                                                  877
                                                                                                                                                                                      901
                                                                                                                                                                                                                          817
                                                                                                                                                                                                                                                              841
                                                                                                                                                                                                                                                                                                     757
                                                                                                                                                                                                                                                                                                                                                                             697
                                                                                                                                                                                                                                                                                                                                                                                                                                                     637
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        661
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                577
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  601
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      517
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       397
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            277
                                                                                                                                                                                                                                                                                                                                       781
                                                                                                                                                                                                                                                                                                                                                                                                               721
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               457
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 481
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            421
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                337
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   218
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           161
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    101
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               9
                             CGCACGCTCCTCGAGGGCAGCNNGTTTGCCGTCCACCACGAGGAGGAGGAGGTCAAGGTCAAG
                                                                                             CONTICCTCCACGACGTCACGCGCCCTCACCCGACCCAGATCGAGGTCGCGCGCAACATC
                                                                                                                                                                                                                                              GCCGTCTCCGCCTCGATGGCGACCCTCGCTCTGCACGACGACACATGCTCTCGCTCCTC
                                                                                                                                                                                                                                                                                                                                                                                               GTNCACGTNNTNCACGAGGGCANNGAGAAGATCATGTNCGCCCGCGAGGCGATCGCGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GECEACCTCTCCCCNCTCTCNTACATCGCCGCCCCATCACCGGTCACCCGGACNNCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GTCAACTCGCTCACNCGCGGCCACTCGGCNGTCCGCCTCGTCGTCCTCGAGGCGCTCACC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GCNCTCCTCGAGCACCAGCTCTGCGGTGTNCTCCCNACGTCGNTCGANTCCTTCNGCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              ACCCCACCGNNACGNACGNNNTCGAACTCGACGGGTACACCCTCACCCTCGGNGACGTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           ATGGCCCCCTCCNTCGACTCGATCGCGACCTCGNTCGCCAACGGCNTCNCNAACGGNTNG
 CGCAAGCTCCTCGAGGGAAGCCGCTTTGCTGTCCACCATGAGGAGGAGGTCAAGGTCAAG
                                                                                                                                                                        TCGCAGGCGCTCACCGGCTCTNACGGTCGAGGCCATGGTCGGCCACGCCAGCCCGCTTCCAC
                                                                                                                                                                                                                            eccenercaecarecarecerecerecaecaecaeaeaearecrerecere
                                                                                                                                                                                                                                                                                                     TTCAACCTCGAGCCCGTCGTCCTCGGCCCCGAAGGAGGGTCTCGGTCTCGTCAACGGCACC
                                                                                                                                                                                                                                                                                                                             TINGGICICGAGCCCGTCGICCICGGCCCGAAGGAGGGICICGGGTCICGICAACGGCACG
                                                                                                                                                                                                                                                                                                                                                                                                                                                       GGCGACCTCTCCTCTCTCCTACATTGCAGCGGCCATCAGCGGTCACCCGGACAGCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          AACTTCCTCAACCACGGCATCACCCCCATCGTCCCCCTCCGCGGCACCATCTCGGCGTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       GGNCGCGGCCTCGAGAACTCGCTTCCGCTCGAGGTCGTCCGCGGGCGCCATGACCATCCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GCTCTCCTCGAGCACCAGCTCTGCGGTGTTCTCCCCTTCGTCGTTCGACTCGTTCCGCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              ACGACTGGTTTCGGCGGCTCGGCCGACACCCGGACTGAGGATGCNATCTCGCTCCAGAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         AAGATCGACAANAGNGTCGAGTTCCTCCGNNCNCAGCTCNACAACAGNGTCTACGGNGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   TCTCGGCCGAGGAAGGGCAGGCCTGTCCGCGTCAAGGACAG-CGACGAGATCCGCTCA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CGCCGACCGACTCGA----CGCTCGAACTCGACGCCTACTCGCTCAACCTCGGAGACGTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      derede a de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composiç
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GCTCGCTCCTCCCGACCCACCCAGNNGACGCAGCTCGACATCGTNGAGNAGATCCTCGCCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 CACGCCGNNCCGNCNNNGNCGNCNACGGGCCACGTCCACNCTCNGNCGGCCGNCGCNG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     ATGGCACCCTCGCTCGACTCGATCTCGCACTCGTTCGCAAACGGCGTCGCATCCGCAAAG
                                                                           CCCTTCCTTCACGACGTCACGCGCCCTCACCCGACGCAGATCGAAGTCGCGGGAAACATC
                                                                                                                                                    TCGCAGTCGCTCACGGCCATGACGGTCGAAGCGATGGTCGGCCACGCCGGCTCGTTCCAC
                                                                                                                                                                                                                                                                                                                                                                             GTGCACGTCGTCCACGAGGGCAAGGAGAAGATCCTGTACGCCCGCGAGGCGATGGCGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                AACTTCCTCAACCACGGCATCACCCCCATCGTCCCCCCTCCGCGCACCATCTCTGCGTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        GTCAACAGCTTGACCCGCGCCACTCGGCTGTCCGCCTCGTCCTCGAGGCGCTCACC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               GGCCGCGGTCTCGAGAACTCGCTTCCCCTCGAGGTTGTTCGCCGCCCCATGACAATCCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    ACGACTGGATTTGGCGGATCCGCAGACACCCGCACCGAGGACGCCATCTCGCTCCAGAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            AAGATTGACAAATCGGTCGAGTTCTTGCGCTCGCAACTCTCCATGAGCGTCTACGGCGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             0;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Mismatches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 322;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Indels
```

1056 1080

1020 996

960 876 900 816 840

936

780 696

756

636 660 576 600 516 540 456 480 396 420 336 360 276 300 217 240 160 180 100

8 유

경 유

밁

Š

Ş

Ď,

2160	2101 TGACGATCGGCACCAACGTCTCCCGCATCTACGAGGCCATCAAGNNCGGCNGCATCAACC
 2065	2041 TCCGCGAGGAGCTCGGCGTCAAGGCCCGCCGCCGGCGACGTCTTCCTCGGCAAGCAGGAGG
2040	1981 CGTCGTCGTCGCCGCGCCTCNCGTACCTCTCGCCGCGCACGCGCGCGCTCTGTACTCGTTCG
1980 1945	1921 CCGCCGAGAAGGCCATCTCGCTCACGCGCNANGTCCGCGACNCCTTCTGGNCGGCNCCGT
1920 1885	1861 NNGICCTCGCCNNNNGCCANNAGGTCTCGCTCGCNGCCGTCAACGCCTGGAAGGTCGCCT
1860 1836	1801 CTGGAGCGGCTGGCACGACGCCTTCTCGTTGGCGACCGGCACCGTCGTCGAGNNNNNN
 1800 1776	1741 CTCGNGGACAAGGTCAACAAGNCGCTCNACAAGCGNCTCGAGCAGACCAACTCGTACGAC
1740 1716	1681 NCNNOGCTCNTCNAGCAGCACTTTGGCNCNGCCCTCGACGGCNNNNNNNNNN
 1680 1656	1621 CAGGCCGTCGACCTCCGCGCGCATGGAGTTCGAGTTCAAGAAGCAGTTCGACCCGNTNNTC
1620 1596	1561 ACNGCCGAGGCCAACGACGTCCTTCTCTCCTCCTCGCCACCCAC
 1536	1501 CAGCOGGCNGAGATGGGCAACCAGGCCGTCAACTCGCTCGCNCTCATCTCGGCNCGCCGC
1500 1476	1441 GCCGCNGCNTACACTTCGGAGCTCGGNCACCTTGCCAACCCGGTNACGACCCACGTC
 1440 1416	1381 CCNTCCTGCCTCGCTGCCGAGGACCCNTCGCTCTCCTATCACTGCAAGGGCCTCGACATT
1380 1356	1321 GGCAAGCTCAACTTCACGCAGCTCACCGAGATGCTCAACGCCGGCATGAACCGCGGCCTN
1320 1296	1261 TTCCAGGCGNCCGCTGTCGCNAACACGATGGAGAAGACTCGCCTCGC
1260 1236	1201 TCGACGACCAACCCGCTCATCGACGTCGAGAAGAAGAAGAAGACCACCACCACCACCGGCGGCAAC
1200 1176	1141 GGCCCGCTCGTCAGCGACATGATTCACGCCCACGCNGTCCTCTCGCTCGAGGCCGGNCAG
 1140 1116	1081 GACGACGAGGGCATTCTCCGCCAGGACGCTAGCCGCTCCGCACGTCGCCTCAGTGGCTC

8 8 8

유

2066 TGACGATCGGCTCGAACGTCTCCAAGATCTACGAGGCCATCAAGTCGGGCAGGATCAACA 2125

8 8

```
REFERENCE
AUTHORS
TITLE
JOURNAL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               RESULT 14
AX082544
LOCUS
DEFINITION
ACCESSION
VERSION
XEYWORDS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 SOURCE
ORGANISM
                                                        Ś
                                                                                                                     Ş
                                                                                                                                                                                                                                            γ
                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                        5
                                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                                    Ş
                                                                                                                                                                                                                                                                                                                                                                                                      밁
                                                                                                                                                                                                                                                                                                                                                                                                                                Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        뮹
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               S
Š
                             뮍
                                                                                           당
                                                                                                                                                     밁
                                                                                                                                                                               5
                                                                                                                                                                                                                В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             FEATURES
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Query Match
Best Local Similarity 83.7
Matches 1829; Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             source
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      2161
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       2126 ACGTCCTCCTCAAGATGCTCGCTTAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                   101
   601
                                                                                           457
                                                                                                                        481
                                                                                                                                                     397
                                                                                                                                                                                    421
                                                                                                                                                                                                                   337
                                                                                                                                                                                                                                                 361
                                                                                                                                                                                                                                                                               277
                                                                                                                                                                                                                                                                                                        301 AAGATCGACAANAGNGTCGAGTTCCTCCGNNCNCAGCTCNACAACAGNGTCTACGGNGTC 360
                                                                                                                                                                                                                                                                                                                                            218
                                                                                                                                                                                                                                                                                                                                                                         241
                                                                                                                                                                                                                                                                                                                                                                                                                        181 ACCCCACCGNNACGNACGNNTCGAACTCGACGGGTACACCCTCACCCTCGGNGACGTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  121
                                                                                                                                                                                                                                                                                                                                                                                                        161 CGCCGACCGACTCGA----CGCTCGAACTCGACGGCTACTCGCTCAACCTCGGAGACGTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                62
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             <u>ب</u>
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Н
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Tang, X.S., Vannelli, T.M., Qi, W.W., Sariaslani, S. and Gatenby, A.A. Bioproduction of para-hydroxycinnamic acid Patent: WO 0111071-A 9 15-FBB-2001;
E.I. DU PONT DE NEWOURS & COMPANY INCORPORATED (US)
LOCATION/QUALIFIERS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  synthetic construct
synthetic construct
artificial sequences.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              AX082544
Sequence 9 from Patent I
AX082544
AX082544.1 GI:13184657
   GTCAACTCGCTCACNCGCGGCCACTCGGCNGTCCGCCTCGTCGTCCTCGAGGCGCTCACC
                                                                                                                                                                                                                                        ACGACTGGTTTCGGCGGCTCGGCCGACACCCGGACTGAGGATGCNATCTCGCTCCAGAAG 420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           GCTCGCTCCCCGACCCAGNNGACGCAGCTCGACATCGTNGAGNAGATCCTCGCCG 180
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CACGCCGNNCCGNCNNNGNCGNCNACGGGCGCCACGTCCACNCTCNGNCGGCCGNCGCNG 120
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        ATGGCCCCCTCCNTCGACTCGATCGCGACCTCGNTCGCCAACGGCNTCNCNAACGGNTNG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            ACGTCCTCGTCAAGATGCTCGCNTAG 2186
                                                                                                                 GENCEGEGCCTCGAGAACTCGCTTCCGCTCGAGGTCGTCCGCGGGGCGCATGACCATCCGC 540
                                                                                                                                                         GCTCTCCTCGAGCAGCTCTGCGGTGTTCTCCCTTCGTCGTTCGACTCGTTCCGCCTC
                                                                                                                                                                            GCNCTCCTCGAGCACCAGCTCTGCGGTGTNCTCCCNACGTCGNTCGANTCCTTCNGCCTC
                                                                                                                                                                                                                                                                                                                                                               TCGGCGCCGCNCGCAAGGGCCGCNCNGTCCGCGTCNCAGACAGNCGACGACGAGATCCGCGCA 300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                   GCTCGCACCTGCCCACAACCCAGGTCACGCAGGTCGACATCGTCGAGAAGATGCTCGCCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CAGGCTGT-----
                                                                                                                                                                                                                   ACGACTGGATTTGGCGGATCCGCAGACACCCGCACCGAGGACGCCATCTCGCTCCAGAAG
                                                                                                                                                                                                                                                                                                                                            TCTCGGCCGAGGAAGGGCAGGCCTGTCCGCGTCAAGGACAG-CGACGAGATCCGCTCA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             ATGGCACCCTCGCTCGACTCGATCTCGCACTCGTTCGCAAACGGCGTCGCATCCGCAAAG
                                                                                            GGCCGCGGTCTCGAGAACTCGCTTCCCCCTCGAGGTTGTTCGCGGCGCCCATGACAATCCGC
                                                                                                                                                                                                                                                                               AAGATTGACAAATCGGTCGAGTTCTTGCGCTCGCAACTCTCCATGAGCGTCTACGGCGTC
                              /organism="synthetic construct"
/mol_type="unassigned DNA"
/mb xref="taxon:32630"
/noTe="mutant from Rhodotorula '
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           2151 bp
from Patent W00111071.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               .2151
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    65.7%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                -----GCATGGCGCCTCGACCAACCTC----GCAGTCGCAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Score 1626.4; DB 6; Length Pred. No. 5e-169; O; Mismatches 322; Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Rhodotorula glutinis"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          2151
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             DNA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             linear
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      2151;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ა
ნ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               PAT 28-FEB-2001
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Gaps
                                                               600
                                                                                                                                                                                                                                                                                                                                                                                                                                       240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                100
   660
                                576
                                                                                            516
                                                                                                                                                         456
                                                                                                                                                                                                                                                                               336
                                                                                                                                                                                                                                                                                                                                            276
                                                                                                                                                                                                                                                                                                                                                                                                                                                                    160
                                                                                                                                                                                      480
                                                                                                                                                                                                                   396
                                                                                                                                                                                                                                                                                                                                                                                                        217
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       5
```

```
밁
                                                 Ş
                                                                          밁
                                                                                            장
                                                                                                                                       성 음 성
                                                                                                                                                                                                          8
8
8
                                                                                                                                                                                                                                                                         8
                                                                                                                                                                                                                                                                                              유
                                                                                                                                                                                                                                                                                                                                           뮍
                                                                                                                                                                                                                                                                                                                                                                 Ş
                                                                                                                                                                                                                                                                                                                                                                                       В
                                                                                                                                                                                                                                                                                                                                                                                                              Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     유 성 유
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                          왕
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      40 A
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    5 B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              $
                                   1597
                                                        1621
                                                                               1537
                                                                                                   1561
                                                                                                                         1477
                                                                                                                                               1501
                                                                                                                                                                    1417
                                                                                                                                                                                        1441
                                                                                                                                                                                                              1357
                                                                                                                                                                                                                                     1381
                                                                                                                                                                                                                                                         1297
                                                                                                                                                                                                                                                                                 1321
                                                                                                                                                                                                                                                                                                      1237
                                                                                                                                                                                                                                                                                                                           1261
                                                                                                                                                                                                                                                                                                                                                  1177
                                                                                                                                                                                                                                                                                                                                                                       1201
                                                                                                                                                                                                                                                                                                                                                                                            1117
                                                                                                                                                                                                                                                                                                                                                                                                                   1141
                                                                                                                                                                                                                                                                                                                                                                                                                                        1057
                                                                                                                                                                                                                                                                                                                                                                                                                                                             1081
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1021
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    997
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              937
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   961
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          877
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     817
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               901
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           841
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 757
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      781
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            697
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 721
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        637
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             661
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   577
CAAGCCATCGACTTGCGCGCGAGCGACCGAGTTCGAGTTCAAGAAGCAGTTCGGCCCAGCCATC
                                                CAGGCCGTCGACCTCCGCGCGATGGAGTTCGAGTTCAAGAAGCAGTTCGACCCGNTNNTC
                                                                                            CAGCCGGCNGAGATGGGCAACCAGGCCGTCAACTCGCTCGCTCGCNCTCATCTCGGCNCGCCGC
                                                                                                                                                                    GCCGCTGCGGCGTACACCTCGGAGTTGGGACACCTCGCCAACCCTGTGACGACGCATGTC
                                                                                                                                                                                 GCCGCNGCNGCNTACACTTCCGGAGCTCGGNCACCTTGCCAACCCGGTNACGACCCACGTC
                                                                                                                                                                                                                           CCNTCCTGCCTGCCGAGGACCCNTCGCTCTCCTATCACTGCAAGGGCCTCGACATT
                                                                                                                                                                                                                                                          GGCAAGCTCAACTTCACGCAGCTCACCGAGATGCTCAACGCCGGCATGAACCGCGGCCTC
                                                                                                                                                                                                                                                                        GGCAAGCTCAACTTCACGCAGCTCACCGAGATGCTCAACGCCGGCATGAACCGCGGCCTN
                                                                                                                                                                                                                                                                                                                                                            TCGACCGACCGACACCCCCCTCATCGACGTCGAGAACAAGANGACCCACCACCACGGCGCAAC
                                                                                                                                                                                                                                                                                                                                                                                                         GGCCCGCTCGTCAGCGACATGATTCACGCCCACGCNGTCCTCTCGCTCGAGGCCGGNCAG
                                                                                                                                                                                                                                                                                                                                                                                                                                         GACGACGAGGGCATTCTCCGCCAGGACCGCTACCCCTTGCGCACGTCTCCTCAGTGGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                        GACGACGAGGGCATTCTCCGCCAGGACCGCTACCCGCTCCGCACGTCGCCTCAGTGGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CGCACGCTCCTCGAGGGCAGCNNGTTTGCCGTCCACCACGAGGAGGAGGAGGTCAAGGTCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           TCGCAGGCGCTCACGGCTCTNACGGTCGAGGCCATGGTCGGCCACGCCGCCTCGTTCCAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GCCGTCTCAGCATCGATGGCCACCCTCGCTCTGCACGACGCACACATGCTCTCGCTCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      GCCGTCTCCGCCTCGATGGCGACCCCTCGCACGACGCACACATGCTCTCGCTCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              TINGGTCTCGAGCCCGTCGTCCTCGGCCCGAAGGAGGGTCTCGGTCTCGTCAACGGCACG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          GTNCACGTNNTNCACGAGGGCANNGAGAAGATCATGTNCGCCCGCGAGGCGATCGCGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      GGCGACCTCTCCCCCNTACATCGCCGCCGCCATCACCGGTCACCCGGACNNCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   AACTTCCTCAACCACGCATCACCCCCATCGTCCCCCTCCGCGGCACCATCTCTGTGCGTCG
                                                                               CAGCCGGCTGAGATGGCGAACCAGGCGGTCAACTCGCTTGCGCTCATCTCGGCTCGTCGC
                                                                                                                                                                                                              CCCTCCTGCCTCGCGGCCGAAGACCCCTCGCTCCTACCACTGCAAGGGCCTCGACATC
                                                                                                                                                                                                                                                                                                       TTCCAGGCTGCCGCTGTGGCCAACACCATGGAGAAGACTCGCCTCGGGCTCGCCCAGATC
                                                                                                                                                                                                                                                                                                                            CGCAAGCTCCTCGAGGGAAGCCGCTTTGCTGTCCACCATGAGGAGGAGGTCAAGGTCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CCCTTCCTTCACGACGTCACGCGCCCTCACCCGACGCAGATCGAAGTCGCGGGAAACATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          TCGCAGTCGCTCACGGCCATGACGGTCGAAGCGATGGTCGGCCACGCCGGCTCGTTCCAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 TTCAACCTCGAGCCCGTCGTCCTCGGCCCGAAGGAGGGTCTCGGTCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             GTGCACGTCGTCCACGAGGGCAAGGAGAAGATCCTGTACGCCCGCGAGGCGATGGCGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GGCGACCTCTCTCTCTCTACATTGCAGCGGCCATCAGCGGTCACCCGGACAGCAAG
               1740
                                                                                                   1620
                                                                                                                         1536
                                                                                                                                                1560
                                                                                                                                                                     1476
                                                                                                                                                                                                                                     1440
                                                                                                                                                                                                                                                         1356
                                                                                                                                                                                                                                                                                 1380
                                                                                                                                                                                                                                                                                                       1296
                                                                                                                                                                                                                                                                                                                           1320
                                                                                                                                                                                                                                                                                                                                                                       1260
                                                                                                                                                                                                                                                                                                                                                                                            1176
                                                                                                                                                                                                                                                                                                                                                                                                                   1200
                                                                                                                                                                                                                                                                                                                                                                                                                                         1116
                                                                                                                                                                                                                                                                                                                                                                                                                                                             1140
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1056
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1080
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1020
                                    1656
                                                         1680
                                                                               1596
                                                                                                                                                                                         1500
                                                                                                                                                                                                                 1416
                                                                                                                                                                                                                                                                                                                                                   1236
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              996
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           936
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                960
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      876
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           900
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 816
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      840
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            756
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 780
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         696
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   636
```

```
REFERENCE
AUTHORS
TITLE
JOURNAL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       RESULT 15
AX370659
LOCUS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 DEFINITION
ACCESSION
VERSION
KEYWORDS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                SOURCE
ORGANISM
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   δõ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              FEATURES
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       g
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CDS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            2161
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    2126
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               2101
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                2006
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1946
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1981
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1886
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1921
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1837
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1861
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1777
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1801
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1717
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1657
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   AX370659
Sequence 9 f
AX370659
AX370659.1
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Gatenby, A.A., Sariaslani, F.S., Tang, X.S., (Bioproduction of para-hydroxyoinnamic acid Patent: WO 0210407-A.9 (07-FEB-2002; E.I. DUPONT DE NEMOURS AND COMPANY (US)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        synthetic
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      synthetic
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ACGTCCTCGTCAAGATGCTCGCNTAG 2186
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            TGACGATCGGCACCAACGTCTCCCGCATCTAGAGGCCATCAAGNNCGGCNGCATCAACC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              NNGTCCTCGCCNNNNGCCANNAGGTCTCGCTCGCNGCCGTCAACGCCTGGAAGGTCGCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    ACGICCICAAGAIGCICGCITAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           TCCGCGAGGAGCTCGGCGTCAAGGCCCGCCGCCGGCGACGTCTTCCCTCGGCAAGCAGGAGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             CGTCGTCGCCCGCGCTCNCGTACCTCTCCGCCGCGCACGCCGCGCCCTCTACTCGTTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        ccecceaerceccarcreeccacceccaaerceecaaeaccrrereerceececer
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                ccecceaeaaeeccarcreercacececaanerceceaenecrrereresenceecnecer
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          TCGTCGACGTC-----
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CTCGAGCCGCGCTGGCACGACGCCTTCTCGTTCGCGACCGGCACCGTCGTCGAGNNNNNNN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CTCGTCGAGAAGGTGAACAAGACGCTCGCCAAGCCTCGAGCAGACCAACTCGTACGAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CTCGNGGACAAGGTCAACAAGNCGCTCNACAAGCGNCTCGAGCAGACCAACTCGTACGAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       GTCTCGCTCATCGACCAGCACTTTGGCTCCGCCATGACCGGCTCGAACCTGCGCGACGAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  TGACGATCGGCTCGAACGTCTCCAAGATCTACGAGGCCATCAAGTCGGGCAGGATCAACA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CGACCTCGTCGCCGCGCTCTCGTACCTCTCGCCGCGCACTCAGATCCTCTACGCCTTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    crearecede de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra del la contra della 
/codon_start=1
/transI_table=11
/transI_table=11
/transI_table=11
/transI_table=11
/protein_id==(0AD26694.1"
/db_xref="GI:19168825"
/db_xref="GI:19168825"
/db_xref="GI:19168825"
/db_xref="GI:19168825"
/db_xref="GI:19168825"
/db_xref="GI:19168825"
/db_xref="GI:19168825"
/transIation="MAPSLUSISIHSFANGVASAKQAVNGASTNLAVAGSHLPTQVTQ
/transIation="MAPSLUSISIHSFANGVASAKQAVNGASTNLAVAGSHLPTQVTQ
/transIation="MapsLusisingkastnly"
/transIation="MapsLusisingkastnly"
/transIation="MapsLusisingkastnly"
/transIation="MapsLusisingkastnly"
/transIation="MapsLusisingkastnly"
/transIation="MapsLusisingkastnly"
/transIation="MapsLusisingkastnly"
/transIation="MapsLusisingkastnly"
/transIation="MapsLusisingkastnly"
/transIation="MapsLusisingkastnly"
/transIation="MapsLusisingkastnly"
/transIation="MapsLusisingkastnly"
/transIation="MapsLusisingkastnly"
/transIation="MapsLusisingkastnly"
/transIation="MapsLusisingkastnly"
/transIation="MapsLusisingkastnly"
/transIation="MapsLusisingkastnly"
/transIation="MapsLusisingkastnly"
/transIation="MapsLusisingkastnly"
/transIation="MapsLusisingkastnly"
/transIation="MapsLusisingkastnly"
/transIation="MapsLusisingkastnly"
/transIation="MapsLusisingkastnly"
/transIation="MapsLusisingkastnly"
/transIation="MapsLusisingkastnly"
/transIation="MapsLusisingkastnly"
/transIation="MapsLusisingkastnly"
/transIation="MapsLusisingkastnly"
/transIation="MapsLusisingkastnly"
/transIation="MapsLusisingkastnly"
/transIation="MapsLusisingkastnly"
/transIation="MapsLusisingkastnly"
/transIation="MapsLusisingkastnly"
/transIation="MapsLusisingkastnly"
/transIation="MapsLusisingkastnly"
/transIation="MapsLusisingkastnly"
/transIation="MapsLusisingkastnly"
/transIation="MapsLusisingkastnly"
/transIation="MapsLusisingkastnly"
/transIation="MapsLusisingkastnly"
/transIation="MapsLusisingkastnly"
/transIation="MapsLusisingkastnly"
/transIation="MapsLusisingkastnly"
/transIation="MapsLusisingkastnly"
/transIation="MapsLusisingkastnly"
/transIation="MapsLusisingkastnly"
/transIation="MapsLusisingkastnly"
/transIation=
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          /organism="synthetic composition"/mol_type="unassigned |
/db_xref="taxon:32630"
1. .2151
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Location/Qualifiers
1. .2151
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        /note="unnamed protein product"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        construct
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         sequences.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             from
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            GI:19168824
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Patent
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         2151 bp
WO0210407
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          -GCTCTCGCTCGCCGCCGTCAACGCCTGGAAGGTCGCCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    2151
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           construct"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   DNA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Q1, W.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   linear
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 and
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Vannelli,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      2125
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1860
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1776
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       2160
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    2065
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             2100
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              2005
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           2040
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1945
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1980
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1885
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1836
```

1946 CGACCTCGTCGCCCGCGCTCTCGTACCTCTCGCCGCGCACTCAGATCCTCTACGCCTTCG	OY 901 TCGCAGGCGCTCACGGCTCTNACGGTCGAGGCCATGGTCGACGCCGGCTCGTTCCAC 960
1981 CGTCGTCGCCCGCGCTCNCGTACCTCTCGCCGCAACGCGCGTCCTGTACTCGTTCG	QY 841 GCCGTCTCGATGGCGACCCTCGCTCTGCACGACGCACACATGCTCTCGCTCCTC 900 D
1837 1921	Qy 781 TINGGICTCGAGCCCGTCGTCGGCCCGAAGGAGGGTCTCGGTCTACGGCACG 840
1861 NNGTCGTCGCCNNNNGCCANNAGGTCTCGCTCGCNGCCGTCAACGCCTGGAAGGTCGCCT	Qy         721 GTNCACGTNNTNCACGAGGGCANNGAGAAAGATCATGTNCGCCCGCGAGGCGATCGCGCTC 780
1717 CTCGTCGAGGAGGTGAACAAGATCGTTCGTCGAGCAGCAGCAGCAGCAAGCTCGTTCGAGCACAAGTCGACCAAGTCGACCAAGTCGACCAAGTCGACCAAGTCGACCAAGTCGACCAAGTCGACCAAGTCGACCAAGTCGACCAAGTCGACCAAGTCGACCAAGTCGACCAAGTCGACCAAGTCGAGCAAGTCGACCAAGTCGACCAAGTCGACCAAGTCGACCAAGTCGACCAAGTCGACCAAGTCGACAAGTCGACAAGTCGACAAGTCGACAAGTCGACAAGTCGACAAGTCGACAAGTCGACAAGTCGACAAGTCGACAAGTCGACAAGTC	Qy 661 GGCGACCTCTCCCCNCTCTCNTACATCGCCGCCCATCACCGGGTCACCCGGACNNCAAG 720
1741 CTCGNGGACAAGAGCACTTTGGCTCCGAGGAGCGAGCGAGACCTAACGAAGGTCGACGAGCACTTCGGTCAAGAGGGACCAACTCGTACGAGCAAGGTCGAGCGAG	QY       601 AACTTCCTCAACCACGGCATCACCCCCATCGTCCCCCCTCCGCGGCACCATCTCGGCGTCG 660       CY
1521 CANGUCATCURCUTCH SUBMITTED CANGULAR TO CONTROL OF THE CONTROL	QY 541 GTCAACTCGCTCACNCGCGGCCACTCGGCNGTCCGCTCGTCGTCGTCGTCGTCACC 600
1537 ACGACCGACCACCACCACCACCACCACCACCACCACCACC	QY 481 GENCECGEGEAGAACTCGCTTCCGCTCGAGGTCCGCGCGGCGCCATGACCATCCGC 540
1477 CAGCCGGCTGAGATGGCGAACCAGGCGTCCAACTCGCCTTGCGCTACCTCACCTCCTCCTCCTCCTCCTCCTCCACCACCTCTACTGCGTNCTC	Qy 421 GCNCTCCTCGAGCACCAGCTCTGCGGTGTNCTCCCNACGTCGNTCGANTCCTTCNGCCTC 480
	Qy       361       ACGACTGGTTTCGGCGGGCTCGGCCGACACCCGGACTGAGGATGCNATCTCGCTCCAGAAG 420       120  Db       337       ACGACTGGATTTGGCGGAATCCGCAGAACACCCGCACCGAGGACGCCATCTCGCTTCCAGAAG 396       Db       Op       O
1357 CCCTCCTCCCCGCGGCCGAAAGACCCCTCGCCTACCACTGCAAGGGCCTCGACATC	Qy 301 AAGATCGACAANAGNGTCGAGGTTCCTCCGNNCNCAGCTCNACAACAGNGTCTACGGNGTC 360
	Qy         241 TCGGCGCCGCNCGCAAGGGCCGCNCNGTCCGCGTCNCAGACAGNCGACGAGATCCGCGCA 300         1 <t< td=""></t<>
1321 GGCAAGCTCAACTTCACGCAGCTCACCGAGATGCTCAACGCCGGGCATGAACCGCGGCCTN	Qy 181 ACCCCACCGNNACGNANTCGAACTCGACGGGTACACCCTCGCGGNGACGTCG 240 Db 161 CGCCGACCGACGCACCGCTCGAACTCGACGGCTACTCGCTCGACGTCGACGTCG 217 Oy
1261 TTCCAGGCGNCCGCTGTCGCNAACACGATGGAGAAGACTGGCCTGGC	Qy         121 GCTCGCTCCCGGACCAGCCAGNNGACGCAGCTCGACATCGTNGAGNAGATCCTCGCCG 180         V
1117	Qy 61 CACGCCGNNCCGNCNNNGNCGNCNACGGGGGCCACGTCCACNCTCNGNCGGCCGNCGCNG 120   Db
1057 GACGACGACGACATGATTCACGCCCACGCNGTCTCTCGCTCGAGGCCGGNCAG	Qy 1 ATGGCCCCTCCNTCGACTCGATCGCGACCTCGNTCGCCAACGGCNTCNCNAACGGNTNG 60 Db 1 ATGGCACCCTCGATCGCAATCTCGCACTCGTTCGCAAACGGCGTCGCATCGCAAAA G 60 Oy
1021	Query Match 65.7%; Score 1626.4; DB 6; Length 2151;  Best Local Similarity 83.7%; Pred. No. 5e-169; Db  Matches 1829; Conservative 0; Mismatches 322; Indels 35; Gaps 5; Ov
961 CCNTTCCTCCACGACGTCACGCCCCTCACCCGACCCAGATCGAGGTCGCGCGCAACATC	WKVAAAESAISLTRQVRETFWSAASTSSPALSYLSPRTQILYAFVREELGVKARRGDV PLGKQEVTIGSNVSKIYEAIKSGRINNVLLKMLA" Qy misc_feature 12151 /note="mutant from Rhodotorula glutinis" Db

dor ees	Db	Ą	Ъ	Ś	8	Ş
rch tim						
Search completed: September 11, 2004, 23:12:51 Job time : 15249.4 secs	2126	2161	2066	2101	2006	2041
ed: Se 49.4 s	2126 ACGTCCTCCAAGATGCTCGCTTAG 2151	2161 ACGTCCTCGTCAAGATGCTCGCNTAG 2186	2066 TGACGATCGGCTCGAACGTCTCCAAGATCTACGAGGCCATCAAGTCGGGCAGGATCAACA 2125	2101 TGACGATCGGCACCAACGTCTCCCGCATCTACGAGGCCATCAAGNNCGGCNGCATCAACC 2160	2006 TCCGCGAGGAGCTTGGCGTCAAGGCCCGCGGGAGACGTCTTCCTCGGCAAGCAA	2041 TCCGCGAGGAGCTCGGCGTCAAGGCCCGCCGCGGCGACGTTTCCTCGGCAAGCAGGAGG 2100
ecs prembe	CCTCA	ICGTCA	ICGGCT	TCGGCA	AGGAGC	AGGAGC
r 11,	AGATGO	AGATGO	CGAACG	CCAACO	TTGGCC	TCGGCC
2004,	TCGCTT	TCGCNI	TOTOC	TCTCC	TCAAGC	TCAAGO
23:12:	AG 21	AG 218	AGATO	GCATC:	300000 	 
: 51	ў.	86	PACGAGO	PACGAGO	CGCGGA	260660
			3CCATC	GCCATC	BACGTC	BACGTC
			AAGTCG	AAGNNC	ITCCIC	TICCIC
			GGCAGG	GECNEC	GGCAAG	GGCAAG
			ATCAA	ATCAAC	CAAGAC	CAGGAC
			A 2125	C 2160	3G 2065	÷ 2100
			U	J	UI	Ų

GenCore version 5.1.6 Copyright (c) 1993 - 2004 Compugen Ltd.

```
Result
No.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Minimum
Maximum
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Database
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Post-processing: Minimum Match 0%
Maximum Match 100%
Listing first 45 s
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Searched:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Title:
Perfect score:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Run
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Scoring table:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Sequence:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              OM nucleic
    Pred. No. is the number of results predicted by chance to have a score greater than or equal to the score of the result being printed, and is derived by analysis of the total score distribution.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   number
1626.4
1626.4
1626.4
1626.4
1626.4
16226.4
16226.4
16224.8
16224.8
16224.8
16224.8
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
16223.3
162
                                                                                                                                                                                                                                                                                        1944
1699.4
1699.4
1677.4
1677.4
1675.8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          DB DB
                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Score
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      seq
Ç
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             of hits satisfying chosen parameters:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        nucleic search, using sw model
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     N_Geneseq_29Jan04:*

1: geneseqn1990s:*
2: geneseqn1990s:*
3: geneseqn2000s:*
4: geneseqn2001s:*
5: geneseqn2001s:*
6: geneseqn2002s:*
7: geneseqn2003s:*
9: geneseqn2003s:*
9: geneseqn2003cs:*
10: geneseqn2003cs:*
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      length: 0
length: 2000000000
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       %
Query
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Gapop 10.0 , Gapext 1.0
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          September 11, 2004, 10:03:28; Search time 1364.94 Seconds (without alignments) 7703.105 Million cell updates/sec
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      US-09-939-408A-20
2475
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    3373863 segs, 2124099041 residues
  atggccccctccntcgactc.....nnnnnnnnnnnnnnnnnnn 2475
                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Length
  DB
                                    ADE36075
ADE36065
AAD33099
                                                                                             MBA95244
AAD45824
AAD458243
AAD458210
ABA95243
AAD4582110
AAN81101
AAN81116
AAN81399
ABA95240
AAD3100
AAD256543
AAD33100
AAD2565924
ABS56543
AD336055
AAD33097
AAD33097
                                                                                                                                                                                                                                                                                                                                                                                                                                                                     ij
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               summaries
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              SUMMARIES
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 6747726
                                                                                                                                                                                                                                                                                      Aba95244 Rhodotoru
Aad45816 Phenylala
Aad45824 Yeast yhe
Aba95243 R. torulo
Aad45815 Rhodotoru
Aan81101 Sequence
Aan81116 L-phenyla
Aan81399 Sequence
                                                    Abs56543
Ade36055
Aad33152
Aad33097
Ade36061
Ade36075
Ade36065
                                                                                                                                                                                          Aad33100
Aad26924
                                                                                                                                                                                                                                                   Aba95240
Aad45812
                                                                                                                                                                                                                                   Aad33076
                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Description
                                        Aad33099
R. glutin
R. plutin
R. plutin
Rhodospor
R. glutin
Rhodospor
Rhodospor
Rhodospor
Rhodospor
Rhodospor
Rhodospor
Rhodospor
Rhodospor
Rhodospor
Rhodospor
                                                                                                                                                                                                                                                   R. gramin
Rhodotoru
                                                                                                                                                                                                                                 Rhodotoru
```

	45	44	43	42	41	40	39	3 8	37	36	G G	34	ω	32	u L	30	29	28	27	20	25	24	
	4	52.	88.	24.	24.	94.	84.	.86	w	1610.4	$\vdash$	162	621.	621.	623.	1623.2	623.	623.	623.	623.	623.	623.	
		4	5	5	5	8	4.	4.	4.	65.1	5	'n	ū	ა	5	5	'n		ū	ū	υ •		
	28	21	S	2741	74	2987	80	78	2787	2061	15	15	15	15	15	2151	15	15	5	5	15	15	
	7	ы	М	σ	σ	Н	<b> </b> 1	σ	9	თ	9	Н	9	9	9	9	ø	9	9	7	σι	σ	
Η .	ADA70967		AAN80457	AAD45823	ABA95251	AAN80456		AAD45814	ABA95242	AAD33095	607	AAN91092	3606	90	ADE36057	ADE36073	ADE36067	ADE36059	E3605	5653	92	AAD33098	
	0967 Ri	0458 Sequenc	457 Seguenc	Q.	5251	0456	2309 Intron-	ŧЛ	242	3095 Rhodoto	36071 Rhodospo	91092	6069 Rhodospo	Ade36063 Rhodospor	6057	e36073 Rhodospo	36067 Rhodos	059 Rhodospo	36053 Rhodosp	56530 R. glut	6923 Rhod	Aad33098 R. glutin	•

## ALIGNMEN

```
RESULT 1
ABA95244
ID ABA9
XX ABA9
AC ABA9
AC ABA9
XX Rhod
DT 10-J
DT 10-J
DT 10-J
DT 10-J
CX Rhod
XX Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
XX Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS Rhod
OS R
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        29-AUG-2003
07-AUG-2003
10-JUN-2002
                         Phenylalanine ammonia lyase polypeptide and polynucleotide useful for treating mammal having disease or disorder from phenylketonuria, cancer, human immunodeficiency virus infection and human cytomegalovirus
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Rhodotorula graminis.
Rhodotorula mucilaginosa.
Rhodotorula mucilaginosa.
Rhodosporidium toruloides.
                                                                                                                                                                         WPI; 2002-268973/31.
P-PSDB; ABB07694.
                                                                                                                                                                                                                                                                            Yoshida RK,
                                                                                                                                                                                                                                                                                                                                                                                                                        24-JUL-2000; 2000US-00624693.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           24-JUL-2001; 2001WO-US023270.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 31-JAN-2002.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           PAL; yeast; phenylalanine ammonia lyase; cinnamic acid; cinnamate; cytostatic; anti-HIV; virucide; nootropic; dermatological; gene therapy;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    ABA95244;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      ABA95244 standard; DNA; 2475
                                                                                                                                                                                                                                                                                                                                                  (PCBU-) PCBU SERVICES INC.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       WO200208402-A2.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         misc_feature
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 consensus;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Rhodotorula PAL consensus polynucleotide sequence
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        (revised)
(revised)
(first en
                                                                                                                                                                                                                                                                            Kootstra AB;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          /*tag= a
/note= "n= A or C or G or T;
at that position"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1. .2475
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Location/Qualifiers
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        entry)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      ₽₽
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       "n" indicates no consensus
```

```
80
                                                Ś
                                                                            음 성 음
                                                                                                                                       5 8 5
                                                                                                                                                                                                      45
45
45
46
46
47
                                                                                                                                                                                                                                                                                              유영
                                                                                                                                                                                                                                                                                                                                                                Š
                                                                                                                                                                                                                                                                                                                                                                                            밁
                                                                                                                                                                                                                                                                                                                                                                                                         8
                                                                                                                                                                                                                                                                                                                                                                                                                                     D.
                                                                                                                                                                                                                                                                                                                                                                                                                                                     중 유
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Dp.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Query Match
Best Local Similarity
Matches 2408; Conserv
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       The invention relates to an isolated and purified yeast phenylalanine ammonia lyase (PAL) polypeptide. The PAL encoding polynucleotide or a host cell comprising the polynucleotide is useful for the production of I-PAL, by adding the polynucleotide or the host cell to a composition comprising trans-cinnamic acid, or trans-cinnamate and ammonia; and for improving the production of PAL, its analog or another optically active unnatural amino acid having PAL-like structure. The PAL polynucleotides are useful for treating a mammal having a disease, disorder or condition selected from phenylketonuria, cancer, human immunodeficiency virus infection and human cytomegalovirus infection. The present sequence represents a consensus polynucleotide sequence of the Rhodotorula PAL. (Updated on 07-AUG-2003 to correct OS field.) (Updated on 29-AUG-2003 to standardise OS field)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Sequence
              721
                                    661
                                                       661
                                                                              601
                                                                                                    601
                                                                                                                        541
                                                                                                                                               541
                                                                                                                                                                      481
                                                                                                                                                                                          481
                                                                                                                                                                                                               421
                                                                                                                                                                                                                                      421
                                                                                                                                                                                                                                                          361
                                                                                                                                                                                                                                                                                361
                                                                                                                                                                                                                                                                                                      301
                                                                                                                                                                                                                                                                                                                           301
                                                                                                                                                                                                                                                                                                                                                 241
                                                                                                                                                                                                                                                                                                                                                                       241
                                                                                                                                                                                                                                                                                                                                                                                            181
                                                                                                                                                                                                                                                                                                                                                                                                                181
                                                                                                                                                                                                                                                                                                                                                                                                                                         121
                                                                                                                                                                                                                                                                                                                                                                                                                                                             121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             щ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ட
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   CACGCCGNNCCGNCNNNGNCGNCNACGGGCGCCACGTCCACNCTCNGNCGGCCGNCGCNG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Fig
                                                                                                                                                                                                               GCNCTCCTCGAGCACCAGCTCTGCGGTGTWCTCCCNACGTCGNTCGANTCCTTCNGCCTC
                                                                                                                                                                                                                                                                                                                                               GCTCGCTCCTGCCGACCACCCAGNNGACGCAGCTCGACATCGTNGAGNAGATCCTCGCCGGCTGCTCGCTCGTCCTCCGCAGCCACCACCCAGNNGACGCAGCTCGACACATCGTNGAGNAGATCCTCGCCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     2475
GTNCACGTNNTNCACGAGGGCANNGAGAAGATCATGTNCGCCCGCGAGGGGATCGCGCTC
                                  GGCGACCTCTCCCCNCTCTCNTACATCGCCGCCCATCACCGGTCACCCGGACNNCAAG
                                                                              AACTICCTCAACCACGGCATCACCCCCATCGTCCCCCTCCGGGGCACCATCTCGGGGTCG
                                                                                                                                       GTCAACTCGCTCACNCGCGGCCACTCGGCNGTCCGCCTCGTCGTCGTCCTCGAGGCGCTCACC
                                                                                                                                                                       GGNCGCCGCCTCGAGAACTCGCTTCCGCTCGAGGTCGTCCGCGGCGCCCATGACCATCCGC
                                                                                                                                                                                  ACGACTGGTTTCGGCGGCTCGGCCGACACCCCGGACTGAGGATGCNATCTCGCTCCAGAAG
                                                                                                                                                                                                                                                                        ACGACTGGTTTCGGCGGCTCGGCCGACACCCCGGACTGAGGATGCNATCTCGCTCCAGAAG
                                                                                                                                                                                                                                                                                                                   AAGATCGACAANAGNGTCGAGTTCCTCCGNNCNCAGCTCNACAACAGNGTCTACGGNGTC
                                                                                                                                                                                                                                                                                                                                                                                            ACCCCACCGNNACGNACGNNTCGAACTCGACGGGTACACCCTCACCCTCGGNGACGTCG
                                                                                                                                                                                                                                                                                                                                                                                                         ACCCCACCGNNACGNNATCGAACTCGACGGGTACACCCTCACCCTCGGNGACGTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              ATGGCCCCTCCNTCGACTCGATCGCGACCTCGNTCGCCAACGGCNTCNCNAACGGNTNG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           ATGGCCCCTCCNTCGACTCGATCGCGACCTCGNTCGCCAACGGCNTCNCNAACGGNTNG
                                                                                                                          GTCAACTCGCTCACNCGCGGCCACTCGGCNGTCCGCCTCGTCGTCGTCGAGGCGCTCACC
                                                                                                                                                                                                                                                                                                      AAGATCGACAANAGNGTCGAGTTCCTCCGNNCNCAGCTCNACAACAGNGTCTACGGNGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         86.0%; Score 2128; DB 6; 1 larity 100.0%; Pred. No. 2.6e-288; Conservative 0; Mismatches 0;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 2
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    BP; 350 A; 869 C;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 135pp;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 English.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    568 G; 341 T; 0 U;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Length 2475;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     347 Other;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          0,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Gaps
                                                                                                                                                                       540
                                                                                                                                                                                           540
                                                                                                                                                                                                                                        480
                                                                                                                                                                                                                                                            420
                                                                                                                                                                                                                                                                                420
                                                                                                                                                                                                                                                                                                                              360
                                                                                                                                                                                                                                                                                                                                                  300
                                                                                                                                                                                                                                                                                                                                                                         300
                                                                                                                                                                                                                                                                                                                                                                                                                                          180
                                                                                                                                                                                                                                                                                                                                                                                                                                                              180
                                    720
                                                         720
                                                                                 660
                                                                                                      660
                                                                                                                           600
                                                                                                                                                 600
                                                                                                                                                                                                                  480
                                                                                                                                                                                                                                                                                                       360
                                                                                                                                                                                                                                                                                                                                                                                             240
                                                                                                                                                                                                                                                                                                                                                                                                                  240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    120
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         120
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      60
                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                               Ś
                                                                                                                                                                                                                                                                                       δ
                                                                                                                                                                                                                                                                                                                 B
                                                                                                                                                                                                                                                                                                                                                           В
                                                                                                                                                                                                                                                                                                                                                                              Ş
                                                                                                                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                                                                                                       Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                   멼
                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           맑
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ş
    유정
                                          밁
                                                              5
                                                                                          망
                                                                                                          Ś
                                                                                                                                  밁
                                                                                                                                                       Ş
                                                                                                                                                                                В
                                                                                                                                                                                                Ş
                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                  Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                       1441
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1141
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1081
     1801
                           1801
                                                1741
                                                                    1741
                                                                                            1681
                                                                                                                1681
                                                                                                                                       1621
                                                                                                                                                             1621
                                                                                                                                                                                  1561
                                                                                                                                                                                                                             1501
                                                                                                                                                                                                                                                   1501
                                                                                                                                                                                                                                                                                             1441
                                                                                                                                                                                                                                                                                                                   1381
                                                                                                                                                                                                                                                                                                                                                             1321
                                                                                                                                                                                                                                                                                                                                                                                    1321
                                                                                                                                                                                                                                                                                                                                                                                                         1261
                                                                                                                                                                                                                                                                                                                                                                                                                               1261
                                                                                                                                                                                                                                                                                                                                                                                                                                                     1201
                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1201
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1141
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1081
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1021
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1021
                                                                                                                                                                                                                                                                                                                                        1381
                                                                                                                                                                                                       1561
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  961
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     961
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           901
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  901
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       841
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             841
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  781
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       781
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            721
                                                                                                                                                                                                                                                                       TCGACGACCGACACCGGTCATCGACGTCGAGAACAAGANGACCCACCACCACGGCGGCAAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               GGCCGGTCGTCAGCGACATGATTCACGCCCACGCNGTCCTCTCGCTCGAGGCCGGNCAG
     CTCGAGCCGCGCTGGCACGACGCCTTCTCGTTCGCGACCGGCACCGTCGTCGAGNNNNNN
                                                                                          CAGGCCGTCGACCTCCGCGCGATGGAGTTCGAGTTCAAGAAGCAGTTCGACCCGNTNNTC
                                                                                                                                                                                                                                         CAGCCGGCNGAGATGGGCAACCAGGCCGTCAACTCGCTCGCNCTCATCTCGGCNCGCCGC
                                                                                                                                                                                                                                                                                                                  CONTCCTGCCTGCCGAGGACCCNTCGCTCTCCTATCACTGCAAGGGCCTCGACATT
                                                                                                                                                                                                                                                                                                                                                            GGCAAGCTCAACTTCACGCAGCTCACCGAGATGCTCAACGCCGGCATGAACCGCGGCCTN
                                                                                                                                                                                                                                                                                                                                                                                                       GACGACGAGGGCATTCTCCGCCAGGACCGCTACCCGCTCCGCACGTCGCCTCAGTGGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      GACGACGAGGGCATTCTCCGCCAGGACCGCTACCCGCTCCGCACGTCGCCTCAGTGGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CGCACGCTCCTCGAGGGCAGCNNGTTTGCCGTCCACCACGAGGAGGAGGTCAAGGTCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 CONTTCCTCCACGACGTCACGCCCCTCACCCGACCCAGATCGAGGTCGCGCGCAACATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CONTTOCTCCACGACGTCACGCCGCCTCACCCGACCAGATCGAGGTCGCGCGCAACATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           GCCGTCTCCGCCTCGATGGCGACCCTCGCTCTGCACGACGCACACATGCTCTCGCTCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    GCCGTCTCCGCCTCGATGGCGACCCTCGCTCTGCACGACGCACACATGCTCTCGCTCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  TINGGTCTCGAGCCCGTCCTCGGCCCGAAGGAGGGTCTCGGTCTCGTCAACGGCACG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GTNCACGTNNTNCACGAGGGCANNGAGAAGATCATGTNCGCCCGCGAGGCGATCGCGCTC
                 CTCGAGCCGCGCTGGCACGACGCCTTCTCGTTCGCGACCGGCACCGTCGTCGAGNNNNNN
                                                CTCGNGGACAAGGTCAACAAGNCGCTCNACAAGCGNCTCGAGCAGACCAACTCGTACGAC
                                                              CTCGNGGACAAGGTCAACAAGNCGCTCNACAAGCGNCTCGAGCAGACCAACTCGTACGAC
                                                                                                                                                                                              CAGCCGGCNGAGATGGGCAACCAGGCCGTCAACTCGCTCGCNCTCATCTCGGCNCGCCGC
                                                                                                                                                                                                                                                                                                                                                                             GGCAAGCTCAACTTCACGCAGCTCACCGAGATGCTCAACGCCGGCATGAACCGCGGGCCTN
                                                                                                                                                                                                                                                                                                                                                                                                                        CGCACGCTCCTCGAGGGCAGCNNGTTTGCCGTCCACCACGAGGAGGAGGTCAAGGTCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                TINGGTCTCGAGCCCGTCGTCCTCGGCCCGAAGGAGGGTCTCGGTCTCGTCAACGGCACG
                                                                                                                                     CAGGCCGTCGACCTCCGCGCGATGGAGTTCGAGTTCAAGAAGCAGTTCGACCCGNTNNTC
                                                                                                                                                                                  1740
                                                                                                                    1740
                                                                                                                                                               1680
                                                                                                                                                                                                           1620
                                                                                                                                                                                                                                                                                                                                         1440
                                                                                                                                                                                                                                                                                                                                                                1380
                                                                                                                                                                                                                                                                                                                                                                                                           1320
                                                                                                                                                                                                                                                                                                                                                                                                                                                       1260
                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1260
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1200
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1140
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1140
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1080
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1080
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1020
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1020
                              1860
                                                   1800
                                                                       1800
                                                                                                                                          1680
                                                                                                                                                                                    1620
                                                                                                                                                                                                                                1560
                                                                                                                                                                                                                                                    1560
                                                                                                                                                                                                                                                                          1500
                                                                                                                                                                                                                                                                                               1500
                                                                                                                                                                                                                                                                                                                      1440
                                                                                                                                                                                                                                                                                                                                                                                     1380
                                                                                                                                                                                                                                                                                                                                                                                                                                1320
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1200
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               960
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               900
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      840
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                780
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     960
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         900
```

```
RESULT 2
AAD45816
ID AAD4
XX AAD
AC AAD4
XX Phe
XX Phe
XX Ve;
XX Phe
XX Ye;
XX Rh
OS Rh
OS Rh
OS Rh
OS Rh
OS Rh
XX V;
XX V;
XX V;
XX V;
XX V;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX Z;
XX
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 DЪ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              멍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Вb
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   07-AUG-2003
27-DEC-2002
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Rhodotorula graminis.
Rhodotorula mucilaginosa.
Rhodosporidium toruloides.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          AAD45816 standard;
            Yoshida
                                                                                                                                                                24-JUL-2000;
24-JUL-2001;
                                                                                                                                                                                                                                                                                      24-AUG-2001; 2001US-00939408
                                                                                                                                                                                                                                                                                                                                                                           01-AUG-2002.
                                                                                                                                                                                                                                                                                                                                                                                                                                                   US2002102712-A1
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     cancer;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Phenylalanine ammonia lyase consensus DNA.
                                                                                    (PCBU-) PCBU
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                2401
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        2401
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        2341
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    2341
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     2281
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     2221
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         2161
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     2161
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     2101
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      2101
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  2041
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     2281
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             2221
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              2041
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1981
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1981
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1921
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1921
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1861
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1861
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           cytomegalovirus
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  phenylalanine ammonia lyase; PAL; EC 4.3.1.5; phenylketonuria; human immunodeficiency virus infection; HIV; gene therapy; hC cytomegalovirus infection; cytostatic; virucide; ds.
    RK,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ACGTCCTCGTCAAGATGCTCGCNTAGNNNCNCNNNCNANNCTCGCNTNNNNNCCNNNCNC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          NNGTCCTCGCCNNNNGCCANNAGGTCTCGCTCGCNGCCGTCAACGCCTGGAAGGTCGCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     NNGTCCTCGCCNNNNGCCANNAGGTCTCGCCTCGCNGCCGTCAACGCCTGGAAGGTCGCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            NNNANAAA 2408
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        NNNANAAA 2408
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       NGTANNCANNNACNCNTNINININANNCNGGNANNGANTNNANGNNTNCGNGNNCNNNNNN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       THNUNCTHINCT CHCHANALCHNGT CHNTHININC THNINGHITHNINNNNNNCHHIC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                NNNCCNNINININNCTINTTINGNINITCGINITCNTGNCNINININCGGAANITINICNICNININININ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        TGACGATCGGCACCAACGTCTCCCGCATCTACGAGGCCATCAAGNNCGGCNGCATCAACC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 CGTCGTCGTCGCCCGCGCTCNCGTACCTCTCGCCGCGCACGCGGCGTCCTGTACTCGTTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CCGCCGAGAAGGCCATCTCGCTCACGCGCNANGTCCGCGACNCCTTCTGGNCGGCNCCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        NGTNNNCANNNACNCNTNNNNNNANNCNGGNANNGANTNNANGNNTNCGNGNNCNNNNNN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     TNINNICATINICATION CALCININNIAN CINICATION TINNING TINNICATION TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING TINNING 
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 NNNCCNNNNNNNCTNTTNGNNNTCGNNTCNTGNCNNNNNCGGAINITNNCNNCNNNNNNN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     ACGTCCTCGTCAAGATGCTCGCNTAGNNNCNCNNNCNANNCTCGCNTNNNNNCCNNNCNC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     TGACGATCGGCACCAACGTCTCCCGCATCTACGAGGCCATCAAGNNCGGCNGCATCAACC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              TCCGCGAGGAGCTCGGCGTCAAGGCCCGCCGCGGCGACGTCTTCCTCGGCAAGCAGGAGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              TCCGCGAGGAGCTCGGCGTCAAGGCCCGCCGCGGCGACGTCTTCCTCGGCAAGCAGGAGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      cercercececececicnes racerececececececececerecreracreerre
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      CCGCCGAGAAGGCCATCTCGCTCACGCGCNANGTCCGCGACNCCTTCTGGNCGGCNCCGT
                                                                                                                                                                    2000US-00624693
2001WO-US023270
        Kootstra AB;
                                                                                        SERVICES INC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   (revised)
(first entry)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          DNA;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          2475
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          BP
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                2400
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    2400
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     2340
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             2340
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 2280
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         2280
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         2220
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     2220
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 2160
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             2160
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              2100
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     2100
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      2040
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  2040
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1980
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1920
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1920
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1980
```

```
WPI; 2002-690616/74.
```

Novel isolated and purified Rhodotorula phenylalanine ammonia lyase polypeptide, useful for treating a mammal having phenylketonuria, continuan immunodeficiency virus or human cytomegalovirus infection.

Claim 5; Page 45-46; 74pp; English.

The present invention relates to yeast (e.g. Rhodotorula) phenylalanine ammonia lyase (PAL; EC 4.3.1.5) proteins and polynucleotides encoding such proteins. PAL sequences are useful for producing L-phenylalanine. They are useful for treating mammals having disease, disorders or conditions that would benefit from treatment with PAL proteins such as phenylketonuria, cancer, human immunodeficiency virus infection (HIV) or human cytomegalovirus (hCMV) infection. Sequences of the invention are also used in gene therapy. The present sequence is PAL consensus DNA. (Updated on 07-AUG-2003 to correct OS field.) e

Sequence 2475 BP; 350 A; 869 C; 568 G; 341 T; 0 U; 347 Other;

5 В δ 밁 δ 밁 Ś 뫄 Ş 밁 Ş 밁 Š 片 Š 片 Ś 밁 8 뮍 Š В Ş Query Match Best Local Similarity Matches 2408; 661 601 601 541 541 481 481 421 421 361 361 301 301 241 241 181 181 121 121 ნ 61 1 ATGGCCCCCTCCNTCGACTCGATCGCGACCTCGNTCGCCAACGGCNTCNCNAACGGNTNG GGCGACCTCTCCCCCCCTCTCNTACATCGCCGCCGCCATCACCGGTCACCCGGACNNCAAG GTCAACTCGCTCACNCGCGGCCACTCGGCNGTCCGCCTCGTCCTCGAGGCGCTCACC GGNCGCGGCCTCGAGAACTCGCTTCCGCTCGAGGTCGTCCGCGCGCCCATGACCATCCGC GCNCTCCTCGAGCACCAGCTCTGCGGTGTNCTCCCNACGTCGNTCGANTCCTTCNGCCTC AAGATCGACAANAGNGTCGAGTTCCTCCGNNCNCAGCTCNACAACAGNGTCTACGGNGTC TCGGCGCCGCNCGCAAGGGCCCGCNCNGTCCCGCGTCNCAGACAGNCGACGAGATCCGCGCA ACCCCACCGNNACGNACGNNNTCGAACTCGACGGGTACACCCTCACCCTCGGNGACGTCG GCTCGCTCCCCGACCACCCAGNNGACGCAGCTCGACATCGTNGAGNAGATCCTCGCCG GCTCGCTCCCGACCACCCAGNNGACGCAGCTCGACATCGTNGAGNAGATCCTCGCCG CACGCCGNNCCGNCNNNGNCGNCNACGGCCGCCACGTCCACNCTCNGNCGGCCGNCGCNG CACGCCGNNCCGNCNNNGNCGNCNACGGCGCCACGTCCACNCTCNGNCGGCCGNCGCNG GTCAACTCGCTCACNCGCGGCCACTCGGCNGTCCGCCTCGTCGTCGAGGCGCTCACC GENCIGOGGECTTOGAGAACTCGCTTCCGCTCGAGGTCGTCCGCGGCGCCATGACCATCCGC GENETICEAGEACEAGETETECGGTGTNETECCNACGTCGNTEGANTECTTENGECTE ACGACTGGTTTCGGCGGCCGGACACCCCGGACTGAGGATGCNATCTCGCTCCAGAAG ACGACTGGTTTCGGCGGCCTCGGCCGACACCCGGACTGAGGATGCNATCTCGCTCCAGAAG AAGATCGACAANAGNGTCGAGTTCCTCCGNNCNCAGCTCNACAACAGNGTCTACGGNGTC TCGGCGCCGCNCGCAAGGGCCGCNCNGTCCGCGTCNCAGACAGNCGACGAGATCCGCGCA ACCCCACCGNNACGNACGNNNTCGAACTCGACGGGTACACCCTCACCCTCGGNGACGTCG ATGGCCCCCTCCNTCGACTCGATCGCGACCTCGNTCGCCAACGGCNTCNCNAACGGNTNG AACTTCCTCAACCACGGCATCACCCCCATCGTCCCCCTCCGCGGCACCATCTCGGCGTCG Conservative 86.0%; 0 Score 2128; DB 6; 1 Pred. No. 2.6e-288; Mismatches 0 Length 2475; Indels 0 660 660 600 540 540 480 480 420 420 360 300 120 720 600 360 300 240 240 180 180 120 60 60

661

GGCGACCTCTCCCCNCTCTCNTACATCGCCGCCGTCACCCGGTCACCCGGACNNCAAG

```
GTNCACGTNVTNCACGAGGGCANNGAGAAGATCATGTNCGCCCGCGAGGCGATCGCGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               GGCAAGCTCAACTTCACGCAGCTCACCGAGATGCTCAACGCCGGCATGAACCGCGGCCTN 1380
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             GGCCCGCTCGTCAGCGACATGATTCACGCCCACGCNGTCCTCTCGCTCGAGGCCGGNCAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             GACGACGAGGGCATTCTCCGCCAGGACCGCTACCCGCTCCGCACGTCGCCTCAGTGGCTC 1140
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CCNTTCCTCCACGACGTCACGCGCCCTCACCCGACCCAGATCGAGGTCGCGCGCAACATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CTCGAGCCGCGCTGGCACGACGCCTTCTCGTTCGCGACCGGCACCGTCGTCGAGNNNNNN
                                           CTCGNGGACAAGGTCAACAAGNCGCTCNACAAGCGNCTCGAGCAGACCAACTCGTACGAC
                                                                       CTCGNGGACAAGGTCAACAAGNCGCTCNACAAGCGNCTCGAGCAGACCAACTCGTACGAC
                                                                                                                                 CAGGCCGTCGACCTCCGCGCGATGGAGTTCGAGTTCAAGAAGCAGTTCGACCCGNTNNTC
                                                                                                                                                                                                                                                                                                             CAGCCGGCNGAGATGGGCAACCAGGCCGTCAACTCGCCTCATCTCGGCNCGCCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                     CAGCCGGCNGAGATGGGCAACCAGGCCGTCAACTCGCTCGCNCTCATCTCGGCNCGCCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CONTCCTGCCTGCCGAGGACCCNTCGCTCTCCTATCACTGCAAGGGCCCTCGACATT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CONTCCTGCCTGCCGAGGACCCNTCGCTCTCCTATCACTGCAAGGGCCTCGACATT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                GGCAAGCTCAACTTCACGCAGCTCACCGAGATGCTCAACGCCGGCATGAACCGCGGCCTN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         TCGACGACCGACACCCGCTCATCGACGTCGAGAACAAGANGACCCACCACGACGAGGCAAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          GGCCCGCTCGTCAGCGACATGATTCACGCCCACGCNGTCCTCTCGCTCGAGGCCGGNCAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                GACGACGAGGGCATTCTCCGCCAGGACCGCTACCCGCTCCGCACGTCGCCTCAGTGGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CGCACGCTCCTCGAGGGCAGCNNGTTTGCCGTCCACGAGGAGGAGGAGGTCAAGGTCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             CGCACGCTCCTCGAGGGCAGCNNGTTTGCCGTCCACCACGAGGAGGAGGTCAAGGTCAAG 1080
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CONTTCCTCCACGACGTCACGCGCCCTCACCCGACCCAGATCGAGGTCGCGCGCAACATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          TCGCAGGCGCTCACGGCTCTNACGGTCGAGGCCATGGTCGGCCACGCCGGCTCGTTCCAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                TCGCAGGCGCTCACGGCTCTNACGGTCGAGGCCATGGTCGGCCACGCCGGCTCGTTCCAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                GCCGTCTCCGCCTCGATGGCGACCCTCGCTCTGCACGACGCACACATGCTCTCGCTCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       TINGGTCTCGAGCCCGTCGTCCTCGGCCCGAAGGAGGGTCTCGGTCTCGTCAACGGCACG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      TTNGGTCTCGAGCCCGTCGTCCTCGGCCCGAAGGAGGGTCTCGGTCTCGTCAACGGCACG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               TCGACGACCGACAACCCGCTCATCGACGTCGAGAACAAGANGACCCACCACGGCGGCAAC
                                                                                        1800
                                                                                                                                      1740
                                                                                                                                                                                                                                                                     1680
                                                                                                                                                                                                                                                                                                                1620
                                                                                                                                                                                                                                                                                                                                                             1620
                                                                                                                                                                                                                                                                                                                                                                                                           1560
                                                                                                                                                                                                                                                                                                                                                                                                                                                    1560
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1500
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1440
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1440
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1380
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1320
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1260
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1260
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1200
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1200
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1140
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1080
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1020
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1020
                                           1800
                                                                                                                                                                                                                            1680
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          960
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     960
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   900
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           900
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         840
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       840
RESULT 3
AAD45824
ID AADX
XX AADA
XX AADA
XX AADA
XX Yeas
XX Yeas
XX Yeas
XX Yeas
XX Yeas
XX EH Cano
XX Rhoo
XX Rhoo
XX ET CDS
ET CDS
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
ET TET
E
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        유
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           DЪ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      맑
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            ₽
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       망
                                                                                                                                                                                                                                                                                                                                                         Yeast; phenylalanine ammonia lyase; PAL; EC 4.3.1.5; phenylketonuria; cancer; human immunodeficiency virus infection; HIV; gene therapy; hC human cytomegalovirus infection; cytostatic; virucide; ds.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            AAD45824
                                                                                                                                                                                                                                                                                                                     Rhodotorula
                                                                                                                                                                                                                                                                                                                                                                                                                                                      Yeast phenylalanine ammonia lyase DNA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      27-DEC-2002
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              2101
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   2401
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           2161
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   2161
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1921
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1801
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         2281
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         2101
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1981
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1981
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1921
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               NNGTCCTCGCCNNNNGCCANNAGGTCTCGCTCGCNGCCGTCAACGCCTGGAAGGTCGCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 TCCGCGAGGAGCTCGGCGTCAAGGCCCGCCGCGGCGACGTCTTCCTCGGCAAGCAGGAGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CCGCCGAGAAGGCCATCTCGCTCACGCGCNANGTCCGCGACNCCTTCTGGNCGGCNCCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       NGTININCANNIACNCNTININININANNCNGGNANNGANTINIANGNNTNCGNGNNCININININ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    NNACCHNANANAMACTATTINGANATCGANTCATGACANANACGGAANATAACANACANANANANA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  ACGTCCTCGTCAAGATGCTCGCNTAGNNNCNCNNNCNANNCTCGCNTNNNNNCCCNNNCNC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              TGACGATCGGCACCAACGTCTCCCGCATCTACGAGGCCATCAAGNNCGGCNGCATCAACC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           TGACGATCGGCACCAACGTCTCCCCGCATCTACGAGGCCATCAAGNNCGGCNGCATCAACC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CGTCGTCGTCGCCCGCGCTCNCGTACCTCTCGCCGCGCACGCGCGTCCTGTACTCGTTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CCGCCGAGAAGGCCATCTCGCTCACGCGCNANGTCCGCGACNCCTTCTGGNCGGCNCCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            standard;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             NNNANAAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     NNNANAAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 NGTININCANNIACNCNTININININANNCNGGNANNGANTINIANGNINTNCGNGINICININININ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         THINNICHTINICTINICTCHCHNINAMCHNGTCHNTHNINNICTHNINGHNTHNINNINNICHTNIC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    NNNCCNNNNNNNCTNTTNGNNNTCGNNTCNTGNCNNNNNCGGANNTNNCNNCNNNNNNN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           ACGTCCTCGTCAAGATGCTCGCNTAGNNNCNCNNNCNANNCTCGCNTNNNNNCCNNNCNC
                                                                                                                                                                                                                                                                                                                  graminis.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      (first
/product= "PAL protein"
/EC_number= "4.3.1.5"
/EC_number= "4.3.1.5"
/ransl_except= (pos:13...15, aa:Xaa)
/note= "Xaa corresponds to Val, Leu, Ph/
/transl_except= (pos:34...36, aa:Xaa)
/note= "Xaa corresponds to Val, Leu, Ph/
/transl_except= (pos:46...48, aa:Xaa)
/note= "Xaa corresponds to Thr, Ala, Se;
                                                                                                                                                                                                                                                                       Location/Qualifiers
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   2408
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          2408
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            DNA;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   entry)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          2163
                                                                                                                                                                                                                              ρ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            ₿P
                                                                                                                                                                                                                                                                                                                                                                                                                                                        #
2
                                                                                             Phe"
                                                                                                                                          Phe"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CCTCGGCAAGCAGGAGG
                                               Phe"
                                                                                                                                                                                                                                                                                                                                                                                     therapy; hCMV;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     2400
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                2400
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              2340
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    2340
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    2280
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  2280
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           2220
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      2160
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              2100
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       2100
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1980
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1920
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1920
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        2220
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 2160
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    2040
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  2040
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1980
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1860
```

용 성 용 성

1681

1441 1441 1501 1501 1561 1561 1621 1621 1621

1741

유 양 명 양 명 양

5

유 성 유 성

1381 1381 1021 1021 1081 1081 1081 1141 1141 11201 1201 1201 1261 1321

8 8 8

유정

961

901

961

성 유 성

841

841

901

유

781

781

8 8

721

σı

$\bullet$	1 except= (pos:7097		te= "Xaa corresponds to Thr" ansl_except= (pos:667669,	ote= "Xaa corresponds to Gly" ransl_except= (pos:547549,	"Xaa corresponds t	"Xaa corresponds to Glu,	"Xaa corresponds to Ile,	"Xaa corresponds to Pro" except= (pos:457459.	ote= "Xaa corresponds to Val"	ransl except= (pos:442 444	5 j	"xaa corresponds to Asp, l_except= (pos:340342,		l_except= (pos:325327,	<pre>/trans1_except= (pos:307309, aa:Xaa) /note= "Xaa corresponds to Arg, Ser"</pre>	_except= (pos:304306, "Xaa corresponds to Lys,	"Xaa corresponds to Asp,	"Xaa corresponds to Thr,	"Xaa corresponds to Gly" except= (pos:259261, a	<pre>/note= "xaa corresponds to Ile, Val, Leu" /transl_except= (pos:226228, aa:Xaa)</pre>	1_except= (pos:196198, aa:Xe	$1$ _except= (pos:193195, aa:x	to Lys,	responds to Val"	Leu"   Dos:16016	note= "Xaa corresponds to Lys,	.0.	<pre>/note= "Xaa corresponds to Ala, Pro, Ser" /transl except= (pos:118120, aa:Xaa)</pre>	17,	/transl_except= (pos:106108, aa:Xaa)	<pre>/ crans1_except= (pos:100102, aa:Xaa) /note= "Xaa corresponds to Thr"</pre>	la,	"Xaa corresponds to Pro,	l_except= (pos:7375, "Xaa corresponds to Thr l except= (pos:78 e1	"Xaa corresponds to	ובק נו
2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1 H H H	* FF FF FT	# # # # # # # # # # # # # # # # # # #	g 17 77 1-1 1-1	1 F ,	η η ·	1 11 11 11 11 11 11 11 11 11 11 11 11 1	1 H	ı i i	FIT	FT	77	η 'H' '	F.1.	11 th	相比	1 H	변 변 년 년	편 FJ	병병	# FT	ы н.	) FI	피 '편 귀 나	ığı ı	7 FE 1	F F F	FF FF	7 F	T FI	H. H.	יי ניי ני	1 1 1	я п г н н г		

```
| Itanal_except= (pos.744. 726, aa:Xaa)
| Increm Tax corresponds to Val. Letu.phe*
| Itanal_except= (pos.751. 753, aa:Xaa)
| Increm Tax corresponds to Lys. Asr., Thr*
| Itanal_except= (pos.975. 777, aa:Xaa)
| Increm Tax corresponds to Lys. Phe*
| Itanal_except= (pos.975. 777, aa:Xaa)
| Increm Tax corresponds to Lys. Phe
| Itanal_except= (pos.1036. 1038, aa:Xaa)
| Increm Tax corresponds to Lys. Thr. Gin. Pro. Trp.
| Ser or a stop codon*
| Itanal_except= (pos.1036. 1033, aa:Xaa)
| Increm Tax corresponds to Lys. Thr. Met*
| Itanal_except= (pos.1036. 1033, aa:Xaa)
| Increm Tax corresponds to Lys. Thr. Met*
| Itanal_except= (pos.1036. 1033, aa:Xaa)
| Increm Tax corresponds to Lys. Thr. Met*
| Itanal_except= (pos.1036. 1033, aa:Xaa)
| Increm Tax corresponds to Lys. Thr. Met*
| Itanal_except= (pos.1036. 1037, aa:Xaa)
| Increm Tax corresponds to Lys. Thr. Met*
| Itanal_except= (pos.1036. 1038, aa:Xaa)
| Increm Tax corresponds to Lys. Thr. Met*
| Itanal_except= (pos.1036. 1049, aa:Xaa)
| Increm Tax corresponds to Thr. Ala. Ser*
| Itanal_except= (pos.1036. 1049, aa:Xaa)
| Increm Tax corresponds to Met*
| Itanal_except= (pos.1046. 1068, aa:Xaa)
| Increm Tax corresponds to Met*
| Itanal_except= (pos.1046. 1068, aa:Xaa)
| Increm Tax corresponds to Met*
| Itanal_except= (pos.1066. 1068, aa:Xaa)
| Increm Tax corresponds to Thr. Ala. Ser*
| Itanal_except= (pos.1066. 1068, aa:Xaa)
| Increm Tax corresponds to Met*
| Itanal_except= (pos.1066. 1068, aa:Xaa)
| Increm Tax corresponds to Thr. Ala. Ser*
| Itanal_except= (pos.1067. 107, aa:Xaa)
| Increm Tax corresponds to Thr. Ala. Ser*
| Itanal_except= (pos.1067. 107, aa:Xaa)
| Increm Tax corresponds to Thr. Ala. Ser*
| Itanal_except= (pos.1076. 107, aa:Xaa)
| Increm Tax corresponds to Thr. Ala. Ser*
| Itanal_except= (pos.1076. 107, aa:Xaa)
| Increm Tax corresponds to Thr. Ala. Ser*
| Itanal_except= (pos.1076. 107, aa:Xaa)
| Increm Tax corresponds to Thr. Ala. Ser*
| Itanal_except= (pos.1076. 107, aa:Xaa)
| Increm Tax corresponds to Thr. Ala. Ser*
| Itanal_except= (pos.1076. 1076, aa:
```

```
S
                         유왕
                                                                                        용
                                                                                                                                                                                                                                                                                                                                       5
                                                                                                                                                                                                                                                                                                                                                                         В
                                                                                                                                                                                                                                                                                                                                                                                                            γQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                               δõ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             ద
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             CCC X PX FFF PFFX DDXXF XXX PPX X FF XXX PFF X
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Query Match
Best Local Similarity
Matches 2037; Conserv
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         The present invention relates to yeast (e.g. Rhodotorula) phenylalanine ammonia lyase (PAL; EC 4.3.1.5) proteins and polynucleotides encoding such proteins. PAL sequences are useful for producing L-phenylalanine.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Novel isolated and purified Rhodotorula phenylalanine ammonia lyase polypeptide, useful for treating a mammal having phenylketonuria, cohuman immunodeficiency virus or human cytomegalovirus infection.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              24-JUL-2000;
24-JUL-2001;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                24-AUG-2001;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Claim
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      US2002102712-A1
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             (PCBU-) PCBU
                                                                                                       475
                                   535
                                                                                                                                                                                                                                                                                                                                                                                                                                                        179
 601
                                                                  541
                                                                                                                                       481
                                                                                                                                                                          415
                                                                                                                                                                                                           421
                                                                                                                                                                                                                                             355
                                                                                                                                                                                                                                                                              361
                                                                                                                                                                                                                                                                                                                 295
                                                                                                                                                                                                                                                                                                                                                  301
                                                                                                                                                                                                                                                                                                                                                                                    236
                                                                                                                                                                                                                                                                                                                                                                                                                       241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             120
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                7;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       \vdash
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         RK,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Page 53-56;
                                                                                                    GCTCGCTCCTCCCGACCACCCAGNNGACGCAGCTCGACATCGTNGAGNAGATCCTCGCCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 CACGCCGNNCCGNCNNNGNCGNCNACGGGCGCCACGTCCACNCTCNGNCGGCCGNCGCNG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        ATGGCCCCCTCCNTCGACTCGATCGCGACCTCGNTCGCCAACGGCNTCNCNAACGGNTNG
                                                         GTCAACTCGCTCACNCGCGGCCACTCGGCNGTCCGCCTCGTCGTCCTCGAGGCGCTCACC
                                                                                                                                                                            GCBCTCCTCGAGCACCAGCTCTGCGGTGTBCTCCCBACGTCGDTCGABTCCTTCVGCCTC
                                                                                                                                                                                              GCNCTCCTCGAGCACCAGCTCTGCGGTGTNCTCCCNACGTCGNTCGANTCCTTCNGCCTC
                                                                                                                                                                                                                                              ACGACTGGTTTCGGCGGCTCGGCCGACACCCCGGACTGAGGATGCVATCTCGCTCCAGAAG
                                                                                                                                                                                                                                                                     ACGACTGGTTTCGGCCGGCCTCGGCCGACACCCCGGACTGAGGATGCNATCTCGCTCCAGAAG
                                                                                                                                                                                                                                                                                                                   AAGATCGACAAVAGBGTCGAGTTCCTCCGBDCBCAGCTCBACAACAGBGTCTACGGHGTC
                                                                                                                                                                                                                                                                                                                                    AAGATCGACAANAGNGTCGAGTTCCTCCGNNCNCAGCTCNACAACAGNGTCTACGGNGTC
                                                                                                                                                                                                                                                                                                                                                                                                      TCGGCGCCGCNCGCAAGGGCCGCNCNGTCCGCGTCNCAGACAGNCGACGAGATCCGCGCA 300
                                                                                                                                                                                                                                                                                                                                                                                                                                                        ACCCCACCGAC---GACGWSVTCGAACTCGACGGGTACACCCTCACCCTCGGHGACGTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                           ACCCCACCGNNACGNACGNNNTGGAACTTCGACGGGTACACCCTCACCCTCGGNGACGTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             GCTCGCTCCTCCCG-CCACCCAGVHGACGCAGCTCGACATCGTBGAGVAGATCCTCGCCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   CACGCCGCTCCGHCCAAGYCGSCWACGGGCGCCACGTCCACHCTCMGMCGGCCGBC-CDG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      ATGGCCCCCTCCBTCGACTCGATCGCGACCTCGBTCGCCAACGGCBTCDCVAACGGVTHG
                                                                                                                                                                                                                                                                                                                                                                                    TCGGCGCCGCBCGCAAGGGCCGCHCBGTCCGCGTC-CAGACAGMCGACGAGATCCGCGCA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              2000US-00624693
2001WO-US023270
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Kootstra
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             SERVICES
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  2001US-00939408
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          note=
                                     CACBCGCGGCCACTCGGCBGTCCGCCTCGTCGTCCTCGAGGCGCTCACC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       78.5%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              74pp;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             INC.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        "Xaa
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                English.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        corresponds
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Score 1944; DB 6;
Pred. No. 1.2e-262;
0; Mismatches 126;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Ö
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Ser,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Arg,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              2163;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          23;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     cancer
                                                                      600
                                                                                                       534
                                                                                                                                         540
                                                                                                                                                                            474
                                                                                                                                                                                                               480
                                                                                                                                                                                                                                                414
                                                                                                                                                                                                                                                                                420
                                                                                                                                                                                                                                                                                                                 354
                                                                                                                                                                                                                                                                                                                                                    360
                                                                                                                                                                                                                                                                                                                                                                                       294
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               178
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                180
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     120
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        60
                                      594
                                                                                                                                                                                                                                                                                                                                                                                                                                                          235
                  Ő
                                              밁
                                                                           5
                                                                                                                        밁
                                                                                                                                                δ
                                                                                                                                                                                 рь
                                                                                                                                                                                                                    8
                                                                                                                                                                                                                                                             g
G
                                                                                                                                                                                                                                                                                       Ş
                                                                                                                                                                                                                                                                                                                                멍
                                                                                                                                                                                                                                                                                                                                                            Ś
                                                                                                                                                                                                                                                                                                                                                                                               В
                                                                                                                                                                                                                                                                                                                                                                                                                                Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Вb
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       유
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                멼
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    망
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                돲
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            닭
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         ₽
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     문
                                                                                                                                                                                                                                                                                                                                    1372
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1135
                                                                                                                                                                                           1492
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1192
                      1681
                                                                                                                            1552
                                                                                                                                                                                                                                                                                                  1441
                                                                                                                                                                                                                                                                                                                                                                                                        1312
                                                                                                                                                                                                                                                                                                                                                                                                                                         1321
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1261
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1201
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1141
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1075
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1081
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1015
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1021
                                                                                        1621
                                                                                                                                                                                                                              1501
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                955
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   961
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      895
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    901
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         835
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          841
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             775
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             781
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                715
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               721
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      655
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      661
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         595
                                                                                                                                                                                                                                                                                     GCCGCNGCNGCNTACACTTCGGAGCTCGGNCACCTTGCCAACCCCGGTNACGACCCAACGTC
                                                                                                                                                                                                                                                                                                                                                                                                                           GGCAAGCTCAACTTCACGCAGCTCACCGAGATGCTCAACGCCGGCATGAACCGCGGCCTN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             GACGACGAGGGCATTCTCCGCCAGGACCGCTACCCGCTCCGCCACGTCGCCTCAGTGGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GCCGTCTCCGCCTCGATGGCGACCCCTCCCTCTGCACGACGCACACATGCTCTCCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           GTNCACGTNNTNCACGAGGGCANNGAGAAGATCATGTNCGCCCGCGAGGCGATCGCGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GGCGACCTCTCCCCCCCCTCTCTACATCGCCGCCGCCATCACCGGTCACCCGGACNNCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         ACTICCTCAACCACGGCATCACCCCCATCGTCCCCCTCCGGGGACCATCTCGGCGTCG
   NCHNCGCTCHTCHAGCAGCACTTTGGCNCNGCCCTCGACGGCNINNNNNNNNNNNNNNNNNACGAA
                                                                             CAGGCCGTCGACCTCCGCGCGATGGAGTTCGAGTTCAAGAAGCAGTTCGACCCGNTNNTC
                                                                                                                                            CAGCCGGCNGAGATGGGCAACCAGGCCGTCAACTCGCTCGCNCTCATCTCGGCNCGCCGC
                                                                                                                                                                                                                                                                   GCCGCBGCBGCBTACACTTCGGAGCTCGGHCACCTTGCCAACCCGGTBACGACCCACGTC
                                                                                                                                                                                                                                                                                                                                                        CCNTCCTGCCTCGCTGCCGAGGACCCNTCGCTCTCCTATCACTGCAAGGGCCTCGACATT
                                                                                                                                                                                                                                                                                                                                                                                                        GGCAAGCTCAACTTCACGCAGCTCACCGAGATGCTCAACGCCGGCATGAACCGCGGCCTB
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               TTCCAGGCGNCCGCTGTCGCNAACACGATGGAGAAGACTCGCCTGGCNCTCGCCCTGATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      TCGACGACCGACACCCGCTCATCGACGTCGAGAACAAGANGACCCACCACCACCGCGCGAAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      egecegereagegaeargarreacececaegerecretesereageceg---ag
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       egcccectcercaeceacareatrcaceccacecnerccrcrcectceaeecceencae
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        GACGACGAGGCATTCTCCGCCAGGACCGCTACCCGCACGTCGCCTCAGTGGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             CGCACGCTCCTCGAGGGCAGCHVGTTTGCCGTCCACCACGAGGAGGAGGTCAAGGTCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               CGCACGCTCCTCGAGGGCAGCNNGTTTGCCGTCCACCACGAGGAGGAGGAGGTCAAGGTCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CCVTTCCTCCACGACGTCACGCGCCCTCACCCGACCCAGATCGAGGTCGCGCGCAACATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      CONTICCTCCACGACGTCACGCGCCCTCACCCGACCCGAGATCGAGGTCGCGCGCAACATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    TCGCAGGCGCTCACGGCTCTBACGGTCGAGGCCATGGTCGGCCACGCCCGGCTCCAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        TCGCAGGCGCTCACGGCTCINACGGTCGAGGCCATGGTCGGCCACGCCGGCTCGTTCCAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             TTBGGTCTCGAGCCCGTCGTCGTCGGCCCGAAGGAGGGTCTCGGTCTCGTCAACGGCACG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              TINGGTCTCGAGCCCGTCGTCCTCGGCCCGAAGGAGGGTCTCGGTCTCGTCAACGGCACG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GTBCACGTYKTSCACGAGGGCAMSGAGAAGATCATGTHCGCCCGCGAGGCGATCGCGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    GGCGACCTCTCCCCBCTCTCBTACATCGCCGCCGCCATCACCGGTCACCCGGACDBCAAG
                                                         CAGGCCGTCGACCTCCGCGCGATGGAGTTCGAGTTCAAGAAGCAGTTCGACCCGVTBVTC
                                                                                                                                                                                              CAGCCGGCHGAGATGGGCAACCÁGGCCGTCAACTCGCTCGCBCTCATCTCGGCBCGCCGC
                                                                                                                                                                                                                                                                                                                                    CCBTCCTGCCTGCCGAGGACCCBTCGCTCTCCTATCACTGCAAGGGCCTCGACATT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                             TTCCAGGCGDCCGCTGTCGCVAACACGATGGAGAGACTCGCCTCGCVCTCGCCCTGATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   TOGACGACCGACAACCCGCTCATCGACGTCGAGAACAAGAHGACCCACCACGGCGGCAAC
                                                                                                                               crerecredecacecacereracidesiscie
                         1740
                                                             1671
                                                                                                                                                               1620
                                                                                                                                                                                                                                                                                                                                       1431
                                                                                                                                                                                                                                                                                                                                                                           1440
                                                                                                                                                                                                                                                                                                                                                                                                            1371
                                                                                                                                                                                                                                                                                                                                                                                                                                             1380
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1191
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1200
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1134
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1140
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1080
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1014
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1020
                                                                                            1680
                                                                                                                             1611
                                                                                                                                                                                                  1551
                                                                                                                                                                                                                                 1560
                                                                                                                                                                                                                                                                     1491
                                                                                                                                                                                                                                                                                                      1500
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1311
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1320
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1251
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1260
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1074
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        954
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           960
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            894
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              900
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 834
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                840
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    774
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      714
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     780
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             654
```

```
RESULT 4
ABA95243
    밁
                                                                                                                                                                                                                                                                                                                                                                                                                          Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ď,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                뭕
Phenylalanine ammonia lyase polypeptide and polynucleotide useful for treating mammal having disease or disorder from phenylketonuria, cance
                                                                                                                                                                                                       CDS
                               WPI; 2002-268973/31.
P-PSDB; ABB07693.
                                                                                                                                                                                                                                    Rhodosporidium toruloides
                                                                                                                                                                                                                                                      PAL; yeast; cytostatic;
                                                                                                                                                                                                                                                                                  R. toruloides PAL polypeptide encoding cDNA.
                                                                                                                                                                                                                                                                                                        07-AUG-2003
10-JUN-2002
                                                                                                                                                                                                                                                                                                                                      ABA95243;
                                                                                                                                                                                                                                                                                                                                                        ABA95243
                                                             Yoshida RK,
                                                                                                     24-JUL-2000; 2000US-00624693
                                                                                                                       24-JUL-2001; 2001WO-US023270
                                                                                                                                           31-JAN-2002
                                                                                                                                                               WO200208402-A2
                                                                                 (PCBU-) PCBU
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1898
                                                                                                                                                                                                                                                                                                                                                                                                           2138
                                                                                                                                                                                                                                                                                                                                                                                                                             2161
                                                                                                                                                                                                                                                                                                                                                                                                                                                 2078
                                                                                                                                                                                                                                                                                                                                                                                                                                                                    2101
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        2018
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          2041
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1958
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1981
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1921
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1840
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1861
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1780
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1801
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1741
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1672
                                                                                                                                                                                                                                                                                                                                                         standard; cDNA;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CGTCGTCGTCGCCCGCGCTCNCGTACCTCTCGCCGCGCACGCGCGCGCTCCTGTACTCGTTCG
                                                                                                                                                                                                                                                                                                                                                                                                                      ACGTCCTCGTCAAGATGCTCGCNTAG 2186
                                                                                                                                                                                                                                                                                                                                                                                                                                                                    TGACGATCGGCACCAACGTCTCCCGCATCTACGAGGCCATCAAGNNCGGCNGCATCAACC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   TCCGCGAGGAGCTCGGCGTCAAGGCCCGCCGCGGCGACGTCTTCCTCGGCAAGCAGGAGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               CCGCCGAGAAGGCCATCTCGCTCACGCGCNANGTCCGCGACNCCTTCTGGNCGGCNCCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            TOGTOCTOGOCHYCTGCCA--AGGTCTCGCTCGCBGCCGTCAACGCCTGGAAGGTCGCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             NNGTCCTCGCCNNNNGCCANNAGGTCTCGCTCGCNGCCGTCAACGCCTGGAAGGTCGCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               CTCGAGCCGCGCTGGCACGACGCCTTCTCGTTCGCGACCGGCACCGTCGTCGAGNNNNNN 1860
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CTCGNGGACAAGGTCAACAAGNCGCTCNACAAGCGNCTCGAGCAGACCAACTCGTACGAC 1800
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              VCBDCGCTCHTCVAGCAGCACTTTGGCDCYGCCCTCGACGGC------WACGAA 1719
                                                                                                                                                                                                                                                                                                                                                                                                           ACGTCCTCGTCAAGATGCTCGCDTAG 2163
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      TCCGCGAGGAGCTCGGCGTCAAGGCCCGCCGCGCGACGTCTTCCTCGGCAAGCAGGAGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CGTCGTCGTCGCCGCGCTCDCGTACCTCTCGCCGCGCACGCGCGTCCTGTACTCGTTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CCGCCGAGAAGGCCATCTCGCTCACGCGCBAVGTCCGCGACHCCTTCTGGBCGGCBCCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 CTCGAGCCGCGCTGGCACGACGCCTTCTCGTTCGCGACCGGCACCGTCGTCGAGCTCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CTCGHGGACAAGGTCAACAAGDCGCTCDACAAGCGBCTCGAGCAGACCAACTCGTACGAC 1779
                                                                                                                                                                                                                                                     phenylalanine ammonia lyase; cinnamic acid; cinnamate; ss;
anti-HIV; virucide; nootropic; dermatological; gene therapy.
                                                                                                                                                                                                                                                                                                      (revised)
(first entry)
                                                             Kootstra
                                                                                 SERVICES
                                                                                                                                                                                                               Location/Qualifiers
                                                                                                                                                                                            /*tag=
                                                                                                                                                                                 product= "phenylalanine
                                                                                                                                                                                                      . .2151
                                                                                 INC
                                                                                                                                                                                                                                                                                                                                                         2439
                                                                                                                                                                                 ammonia lyase"
  cancer,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                   2160
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1957
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         2100
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1980
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1897
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1920
                                                                                                                                                                                                                                                                                                                                                                                                                                                2137
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             2017
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      2077
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 2040
                   В
                                      S
                                                          B
                                                                         Ś
                                                                                                  밁
                                                                                                                   Ś
                                                                                                                                         B
                                                                                                                                                          5
                                                                                                                                                                                밁
                                                                                                                                                                                                  Ş
                                                                                                                                                                                                                       В
                                                                                                                                                                                                                                         Ś
                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                Š
                                                                                                                                                                                                                                                                                                     뮹
                                                                                                                                                                                                                                                                                                                       Š
                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                              Ş
                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                      Ş
                                                                                                                                                                                                                                                                                                                                                                                                                          В
                                                                                                                                                                                                                                                                                                                                                                                                                                            S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                  片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 PEXMXODDDDDDDDDDDDDXX
```

```
human immunodeficiency virus infection and human cytomegalovirus
```

Fig 2 ; 135pp;

The invention relates to an isolated and purified yeast phenylalanine ammonia lyase (PAI) polypeptide. The PAI encoding polynucleotide or a host cell comprising the polynucleotide is useful for the production of I-PAI, by adding the polynucleotide or the host cell to a composition comprising trans-cinnamic acid, or trans-cinnamate and ammonia; and for improving the production of PAI, its analog or another optically active unnatural amino acid having PAI-like structure. The PAI polynucleotides are useful for treating a mammal having a disease, disorder or condition selected from phenylketonuria, cancer, human immunodeficiency virus selected from phenylketonuria, cancer, human immunodeficiency virus infection and human cytomegalovirus infection. The present sequence represents a R. toruloides PAI polypeptide encoding cDNA. (Updated on AUG-2003 to correct OS field.) of L 9

Sequence 2439 BP; 440 A; 920 C; 631 G; 448 T; 0 U; 0 Other;

68.7%; 79.4%;

Score 1699.4; DB 6; Pred. No. 1.4e-228;

Length 2439;

```
Query Match
Best Local Similarity
Matches 1913; Conserv
                                                                                                                       577
                                                                                                                                                              601
                                                                                                                                                                                                       517
                                                                                                                                                                                                                                              541
                                                                                                                                                                                                                                                                                     457
                                                                                                                                                                                                                                                                                                                              481
                                                                                                                                                                                                                                                                                                                                                                       397
                                                                                                                                                                                                                                                                                                                                                                                                                421
                                                                                                                                                                                                                                                                                                                                                                                                                                                          337
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        277
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        218
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          161
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        101
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               61
GTNCACGTNNTNCACGAGGGCANNGAGAAGATCATGTNCGCCCGCGAGGCGATCGCGCTC
                                                                 GECGACCTCTCCCCNCTCTCNTACATCGCCGCCGCCATCACCGGTCACCCGGACNNCAAG
                                                                                                                                                 AACTTCCTCAACCACGGCATCACCCCCATCGTCCCCCTCCGGCGGCACCATCTCGGCGTCG
                                                                                                                                                                                                                                                                                                                                                                                               GCNCTCCTCGAGCACCAGCTCTGCGGTGTNCTCCCNACGTCGNTCGANTCCTTCNGCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        AAGATCGACAANAGNGTCGAGTTCCTCCGNNCNCAGCTCNACAACAGNGTCTACGGNGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      TCTCGGCCGCAGGAAGGGCAGGCCTGTCCGCGTCAAGGACAG-CGACGAGATCCGCTCA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               ACCCCACCGNNACGNACGNNTCGAACTCGACGGGTACACCCTCACCCTCGGNGACGTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    GCTCGCTCCCGACCACCCAGNNGACGCAGCTCGACATCGTNGAGNAGATCCTCGCCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CAGGCTGT----
                                    GGCGACCTCTCTCTCTCTACATTGCAGCGGCCATCAGCGGTCACCCGGACAGCAAG
                                                                                                                       AACTTCCTCAACCACGGCATCACCCCCATCGTCCCCCTCCGCGGCACCATCTCTGCGTCG
                                                                                                                                                                                                       GTCAACAGCTTGACCCGCGGCCACTCGGCTGTCCGCCTCGTCGTCCTCGAGGCGCTCACC
                                                                                                                                                                                                                                                GTCAACTCGCTCACNCGCGGCCACTCGGCNGTCCGCCTCGTCGTCCTCGAGGCGCTCACC
                                                                                                                                                                                                                                                                                     GGCCGCGGTCTCGAGAACTCGCTTCCCCTCGAGGTTGTTCGCGGCGCCATGACAATCCGC
                                                                                                                                                                                                                                                                                                                              egnegegecercaagaacregerreegeregaggreeregegegegeargaceareege
                                                                                                                                                                                                                                                                                                                                                                       GCTCTCCTCGAGCACCAGCTCTGCGGTGTTCTCCCTTCGTCGTTCGACTCGTTCCGCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                          ACGACTGGATTTGGCGGATCCGCAGACACCCGCACCGAGGACGCCATCTCGCTCCAGAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              ACGACTGGTTTCGGCGGCCTCGGCCGACACCCCGGACTGAGGATGCNATCTCGCTCCAGAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     AAGATTGACAAATCGGTCGAGTTCTTGCGCTCGCAACTCTCCATGAGCGTCTACGGCGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               TCGGCGCCCCCAAGGGCCGCNCNGTCCGCGTCNCAGACAGNCGACGAGATCCGCGCA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      CGCCGACCGACTCGA---CGCTCGAACTCGACGGCTACTCGCTCAACCTCGGAGACGTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        GCTCGCACCTGCCCACAACCCAGGTCACGCAGGTCGACATCGTCGAGAAGATGCTCGCCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CACGCCGNNCCGNCNNNGNCGNCNACGGGGGGCGCCACGTCCACNCTCNGNCGGCCGNCGCNG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    ATGGCACCCTCGACTCGATCTCGCACTCGTTCGCAAACGGCGTCGCATCCGCAAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             ATGGCCCCCTCCNTCGACTCGATCGCGACCTCGNTCGCCAACGGCNTCNCNAACGGNTNG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        -----GCAGTCGCCTCGACCAACCTC-----GCAGTCGCAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       0
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Mismatches 459;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       36;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                480
780
                                       696
                                                                                720
                                                                                                                       636
                                                                                                                                                              660
                                                                                                                                                                                                       576
                                                                                                                                                                                                                                                600
                                                                                                                                                                                                                                                                                     516
                                                                                                                                                                                                                                                                                                                              540
                                                                                                                                                                                                                                                                                                                                                                       456
                                                                                                                                                                                                                                                                                                                                                                                                                                                       396
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        336
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      276
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               180
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      100
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        217
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        160
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             120
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                9
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       6
```

```
1717
                        1801
                                                                                                      1741
                                                                                                                                                1657
                                                                                                                                                                                       1681
                                                                                                                                                                                                                                1597
                                                                                                                                                                                                                                                                     1621
                                                                                                                                                                                                                                                                                                               1537
                                                                                                                                                                                                                                                                                                                                                      1561
                                                                                                                                                                                                                                                                                                                                                                                                1477
                                                                                                                                                                                                                                                                                                                                                                                                                                       1501
                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1417
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1441
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1357
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1381
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1297
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1321
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1237
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1261
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1177
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1201
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1117
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1141
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1057
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1081
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1021
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   877
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 997
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    937
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         961
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            901
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   817
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        841
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     697
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    757
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           781
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   GTGCACGTCGTCCACGAGGGCAAGGAGAAGATCCTGTACGCCCGCAGGGCGATGGCGCTC
CTCGAGCCGCGCTGGCACGCCTTCTCGTTCGCGACCGGCACCGTCGTCGAGNNNNNN
                                                                                       CTCGNGGACAAGGTCAACAAGNCGCTCNACAAGCGNCTCGAGCAGACCAACTCGTACGAC
                                                                                                                                                GTCTCGCTCATCGACCAGCACTTTGGCTCCGCCATGACCGGCTCGAACCTGCGCGACGAG
                                                                                                                                                                          CAGGCCGTCGACCTCCGCGCGATGGAGTTCGAGTTCAAGAAGCAGTTCGACCCGNTNNTC
                                                                                                                                                                                                                                                                                                                                       GCCGCTGCGGCGTACACCTCGGAGTTGGGACACCTCGCCAACCCTGTGACGACGCATGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          GCCGCNGCNGCNTACACTICCGGAGCTCGGNCACCTIGCCAACCCGGTNACGACCCACGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          GGCAAGCTCAACTTCACGCAGCTCACCGAGATGCTCAACGCCGGCATGAACCGCGGGCCTN 1380
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        TTCCAGGCCNCCGCTGTCGCNAACACGATGGAGGAGACTCGCCCTCGCNCTCGCCCTGATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 TCGACGACCGACACCCTCTCATCGACGTCGAGAACAAGACTTCGCACCACGGCGCCAAT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  TCGACGACCGACCACCGCTCATCGACGTCGAGAACAAGANGACCCACCACCACCGCGGCGACAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GCCCGCTCGTCAGCGACATGATTCACGCCCACGCNGTCCTCTCGCTCGAGGCCGGNCAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                GACGACGAGGGCATTCTCCGCCAGGACCGCTACCCCTTGCGCACGTCTCCTCAGTGGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             GACGACGAGGGCATTCTCCGCCAGGACCGCTACCCGCTCCGCACGTCGCCTCAGTGGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CGCACGCTCCTCGAGGGCAGCNNGTTTGCCGTCCACCACGAGGAGGAGGAGGTCAAGGTCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CCNTTCCTCCACGACGTCACGCGCCCTCACCCGACCCCAGATCGAGGTCGGGGGGAACATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               TCGCAGGCGCTCACGGCTCTNACGGTCGACGCCATGGTCGGCCACGCCGCGCTCGTTCCAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     gccgrcrcAgcArcgArcgccAcccrcgcrcrgcAcGAcGAcAcArgcrcrcgcrccrc
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             GCCGTCTCCGCCTCGATGGCGACCCTCGCTCTGCACGACGCACACATGCTCTCGCTCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      TTCAACCTCGAGCCCGTCGTCCTCGGCCCGAAGGAAGGTCTCGGTCTCGTCAACGGCACC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              TINGGICICGAGCCCGICGICCTCGGCCCGAAGGAGGGTCTCGGICTCGTCAACGGCACG
                                                                 CTCGTCGAGAAGGTGAACAAGACGCTCGCCAAGCGCCTCGAGCAGACCAACTCGTACGAC
                                                                                                                                                                                                                                CAAGCCATCGACTTGCGCGCGATCGAGTTCGAGTTCAAGAAGCAGTTCGGCCCAGCCATC
                                                                                                                                                                                                                                                                                                                 CAGCCGGCTGAGATGGCGAACCAGGCGGTCAACTCGCTTGCGCTCATCTCGGCTCGTCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                       CAGCCGGCNGAGATGGGCAACCAGGCCGTCAACTCGCTCGCNCTCATCTCGGCNCGCCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 cccrecrecerededadadececredererectaceaerecaaegeceredacare
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      CONTCCTGCCTGCCGAGGACCCNTCGCTCTCCTATCACTGCAAGGGCCTCGACATT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GGCAAGCTCAACTTCACGCAGCTCACCGAGATGCTCAACGCCGGCATGAACCGGCGCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  TTCCAGGCTGCCGCTGTGGCCAACACCATGGAGAAGACTCGCCTCGGGCTCGCCCAGATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 CGCAAGCTCCTCGAGGGAAGCCGCTTTGCTGTCCACCATGAGGAGGAGGTCAAGGTCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CCCTTCCTTCACGACGTCACGCGCCCTCACCCGACGCAGATCGAAGTCGCGGGAAACATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     TCGCAGTCGCTCACGGCCATGACGGTCGAAGCGATGGTCGGCCACGCCGGCTCGTTCCAC
                                                                                                          1800
                                                                                                                                                    1716
                                                                                                                                                                                                                                                                          1680
                                                                                                                                                                                                                                                                                                                                                        1620
                                                                                                                                                                                                                                                                                                                                                                                                                                           1560
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1476
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1416
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1440
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1356
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1320
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1236
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1260
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1176
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1200
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1116
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1140
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1056
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1080
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1020
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           840
                            1860
                                                                 1776
                                                                                                                                                                                                                                  1656
                                                                                                                                                                                                                                                                                                                   1596
                                                                                                                                                                                                                                                                                                                                                                                                  1536
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1500
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1296
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       936
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              960
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        876
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             900
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      816
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      966
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     756
      RRESULT 5
AAD445E1
ID AAD4
XX 07-A
DT 27-D
DE Rhod
XX Yeas
KW Yeas
KW Cano
KW Cano
KW huma
XX huma
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX Cano
XX 
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                               07-AUG-2003
27-DEC-2002
      24-JUL-2000; 2000US-00624693
                                                24-AUG-2001; 2001US-00939408
                                                                                       01-AUG-2002
                                                                                                                                                                                                                                                                                           Rhodosporidium
                                                                                                                                                                                                                                                                                                                                                                                                                          Rhodotorula toruloides PAL DNA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            AAD45815;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   AAD45815 standard;
                                                                                                                                US2002102712-A1
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           2126
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                2161
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   2101
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            2006
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          2365
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               2401
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        2305
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                2341
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       2246
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                2281
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        2186
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 2221
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         2066
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   2041
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1946
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1981
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1886
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1921
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1837
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1861
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1777
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               NINIANAAA 2408
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              TCGTCGACGTC-----
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CGCATAAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                               (revised)
(first entry)
                                                                                                                                                                                                                                                                                                toruloides.
                                                                                                                                                             /*tag= a
/product= "PAL protein"
/EC_number= "4.3.1.5"
                                                                                                                                                                                                                                                      Location/Qualifiers
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          2372
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     DNA;
                                                                                                                                                                                                                                     .2151
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     2439
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     ВР
```

S ДЪ Š В 5 8

유 성

В 5 В 8 В 8 В 5 В Š В Ś 밁 Ś 밁 Ş В 8 망 8 밁 Ş 밁 5 8 δ B

```
Yeast; phenylalanine ammonia lyase; PAL; EC 4.3.1.5; phenylketonuria; cancer; human immunodeficiency virus infection; HIV; gene therapy; hCMV; human cytomegalovirus infection; cytostatic; virucide; gene; ds.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 NNGTCCTCGCCNNNNGCCANNAGGTCTCGCTCGCNGCCGTCAACGCCTGGAAGGTCGCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CCGCCGAGAAGGCCATCTCGCTCACGCGCNANGTCCGCGACNCCTTCTGGNCGGCNCCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     NGTNINICANNINACNCINTINININININANICNGGNANINGANTINIANGINITNCGNGNINCININININ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     TNINNICHTHICTCHCHNINNANCHNGTCHNTHINNINCTHNINGHNTHINNINNINCHNINC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        NNNCCNNNNNNNCTNTTNGNNNTCGNNTCNTGNCNNNNNCGGANNTNNCNNCNNNNNNN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           ACGTCCTCGAGATGCTCGCNTAGNNCNCNNNCNANNCTCGCNTNNNNNNCCNNNCNC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 TGACGATCGGCACCAACGTCTCCCGCATCTACGAGGCCATCAAGNNCGGCNGCATCAACC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               TCCGCGAGGAGCTCGGCGTCAAGGCCCGCCGCGGCGACGTCTTCCTCGGCAAGCAGGAGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CGTCGTCGTCGCCGCGCTCNCGTACCTCTCGCCGCGCACGCGCGCGTCCTGTACTCGTTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             ccecceaerceeccarcreecreaeceaeceaerceeceaeacerrereerceecer
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CTCGTCCCGCGCTGGCACGACGCCTTCTCCTTCGCCGCCGCCACCGTCGTCGAGGTCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 regriteriegerecerete. Tagacegréreceratraceregagatiqueana caage
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              TAT CCCGCCTGCACTCTTAGGACTCGCTTCTTGTCGGACTCGGATCTCGCATCGCTTCTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              TGACGATCGGCTCGAACGTCTCCAAGATCTACGAGGCCATCAAGTCGGGCAGGATCAACA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ceaccreeredecedecreredracereredecededaereaearecreraedecerred
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  AGTACCCATCCACGCATCCGATAAATCAGGGAGAGAATCTACGCTTGCGGGAGCTTCTTG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ACGTCCTCAAGATGCTCGCTTAGACACTCTTCCCACTCTCGCATCCCTTCCATACCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                dererederedecedereAAceceredAAGeredece
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              2400
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       2125
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             2160
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          2100
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          2040
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1945
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1980
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1885
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1920
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        2364
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 2340
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    2245
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    2185
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          2220
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       2065
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   2005
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1836
```

```
Query Match
Best Local Simi
Matches 1913;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        ammonia lyase (PAL, EC 4.3.1.5) proteins and polynucleotides encoding such proteins. PAL sequences are useful for producing L-phenylalanine. They are useful for treating mammals having diseases, disorders or conditions that would benefit from treatment with PAL proteins such as phenylketonuria, cancer, human immunodeficiency virus infection (HIV) or human cytomegalovirus (hcMV) infection. Sequences of the invention are also used in gene therapy. The present sequence is R. toruloides PAL DNA. (Updated on 07-AUG-2003 to correct OS field.)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Sequence 2439 BP; 440 A; 920 C; 631 G; 448 T; 0 U; 0 Other;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Novel isolated and purified Rhodotorula phenylalanine ammonia lyase polypeptide, useful for treating a mammal having phenylketonuria, cancer, human immunodeficiency virus or human cytomegalovirus infection.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Example 3; Page 41-43; 74pp; English
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        24-JUL-2001;
                       601
                                                                                        541
                                                                                                                           457
                                                                                                                                                              481
                                                                                                                                                                                             397
                                                                                                                                                                                                                                421
                                                                                                                                                                                                                                                                  337
                                                                                                                                                                                                                                                                                                   361
                                                                                                                                                                                                                                                                                                                                      277
                                                                                                                                                                                                                                                                                                                                                                       301
                                                                                                                                                                                                                                                                                                                                                                                                          218
                                                                                                                                                                                                                                                                                                                                                                                                                                             241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                161
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  101
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  2002-690616/74
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            ப
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Similarity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        PCBU
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          ACCCCACCGNNACGNACGNNNTCGAACTCGACGGTACACCCTCACCCTCGGNGACGTCG
AACTICCTCAACCACGGCATCACCCCCATCGTCCCCCTCCGGGGACCATCTCGGGGTCG
                                                                                                                                                                                                                     GCNCTCCTCGAGCACCAGCTCTGCGGTGTNCTCCCNACGTCGNTCGANTCCTTCNGCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GCTCGCTCCTCCCGACCCACCCAGNNGACGCAGCTCGACATCGTNGAGNAGATCCTCGCCG
                                                       GTCAACAGCTTGACCCGCGGCCACTCGCCTGTCGCCTCGTCGTCGAGGCGCTCACC
                                                                                                                                                                                                                                                                                             ACGACTGGTTTCGGCGGCTCGGCCGACACCCCGGACTGAGGATGCNATCTCGCTCCAGAAG
                                                                                                                                                                                                                                                                                                                                      AAGATTGACAAATCGGTCGAGTTCTTGCGCTCGCAACTCTCCATGAGCGTCTACGGCGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CGCCGACCGACTCGA----CGCTCGAACTCGACGGCTACTCGCTCAACCTCGGAGACGTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CAGGCTGT--
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      CACGCCGNNCCGNCNNGNCGNCNACGGGCGCCACGTCCACNCTCNGNCGGCCGNCGCNG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          ATGGCCCCCCCCTCGATCGATCGCGACCTCGNTCGCCAACGGCNTCNCNAACGGNTNG
                                                                                        GTCAACTCGCTCACNCGCGGCCACTCGGCNGTCCGCCTCGTCGTCCTCGAGGCGCTCACC
                                                                                                                           GECCECEGTCTCGAGAACTCGCTTCCCCTCGAGGTTGTTCGCGGCGCCATGACAATCCGC
                                                                                                                                                            GENCECEGCCTCGAGAACTCGCTTCCGCTCGAGGTCGTCCGCGGCGCCATGACCATCCGC
                                                                                                                                                                                                                                                                  <u>ACGACTGGATTTGGCGGATCCGCAGACACCCGCACCGAGGACGCCATCTCGCTCCAGAAG</u>
                                                                                                                                                                                                                                                                                                                                                                     AAGATCGACAANAGNGTCGAGTTCCTCCGNNCNCAGCTCNACAACAGNGTCTACGGNGTC
                                                                                                                                                                                                                                                                                                                                                                                                        TCTCGGCCGCGAGGAAGGGCAGGCCTGTCCGCGTCAAGGACAG-CGACGAGATCCGCTCA
                                                                                                                                                                                                                                                                                                                                                                                                                                           TCGGCGCCGCNCGCAAGGGCCGCNCNGTCCGCGTCNCAGACAGNCGACGAGATCCGCGCA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 GCTCGCACCTGCCCACAACCCAGGTCACGCAGGTCGACATCGTCGAGAAGATGCTCGCCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         ATGGCACCCTCGCTCGACTCGATCTCGCACTCGTTCGCAAACGGCGTCGCATCCGCAAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        SERVICES
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         2001WO-US023270
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            68.7%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             o
;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Score 1699.4; DB 6; Pred. No. 1.4e-228;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ----CAATGGCGCCTCGACCAACCTC----GCAGTCGCAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Mismatches 459;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Length 2439
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             36;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                           300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        120
                      660
                                                       576
                                                                                        600
                                                                                                                           516
                                                                                                                                                            540
                                                                                                                                                                                             456
                                                                                                                                                                                                                                480
                                                                                                                                                                                                                                                                  396
                                                                                                                                                                                                                                                                                                   420
                                                                                                                                                                                                                                                                                                                                      336
                                                                                                                                                                                                                                                                                                                                                                     360
                                                                                                                                                                                                                                                                                                                                                                                                          276
                                                                                                                                                                                                                                                                                                                                                                                                                                                                            217
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  160
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  180
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     100
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             9
   뮍
                         Ş
                                                                    뮍
                                                                                                 5
                                                                                                                                  B
                                                                                                                                                                    5
                                                                                                                                                                                                              멼
                                                                                                                                                                                                                                        5
                                                                                                                                                                                                                                                                               망
                                                                                                                                                                                                                                                                                                                Š
                                                                                                                                                                                                                                                                                                                                                   В
                                                                                                                                                                                                                                                                                                                                                                                Ś
                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                      Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     δã
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                ₽
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 망
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               δÃ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     δÃ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1177
                                                                                                                                          1537
                                                                                                                                                                             1561
                                                                                                                                                                                                                                                                                  1417
                                                                                                                                                                                                                                                                                                                   1441
                                                                                                                                                                                                                                                                                                                                                      1357
                                                                                                                                                                                                                                                                                                                                                                                      1381
                                                                                                                                                                                                                                                                                                                                                                                                                           1297
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1237
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1117
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1057
                                                                                                                                                                                                                                               1501
                                                                                                                                                                                                                                                                                                                                                                                                                                                            1321
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1261
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1201
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1141
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1081
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1021
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              997
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                937
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 961
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    877
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      901
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       817
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        841
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         757
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            781
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               697
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  637
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      577
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     661
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               721
   GTCTCGCTCATCGACCAGCACTTTGGCTCCGCCATGACCGGCTCGAACCTGCGCGACGAG
                                 CAGGCCGTCGACCTCCGCGCGATGGAGTTCGAGTTCAAGAAGCAGTTCGACCCGNTNNTC
                                                                                                                                                                GCCGCNGCNGACACTTCGGAGCTCGGNCACCTTGCCAACCCGGTNACGACCCACGTC
                                                                                                                                                                                                                                                                                                                                                                                CONTCCTGCCTGCCGAGGACCCNTCGCTATCACTGCAAGGGCCTCGACATT
                                                                                                                                                                                                                                                                                                                                                                                                                                                    GCCAAGCTCAACTTCACGCAGCTCACCGAGATGCTCAACGCCGGCATGAACCGCGGCCTN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 TCGACGACCGACACCCGCTCATCGACGTCGAGAACAAGANGACCCACCACGGCGGCAAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        GGCCCGCTCGTCAGCGACATGATTCACGCCCACGCNGTCCTCTCGCTCGAGGCCGGNCAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           GACGACGAGGGCATTCTCCGCCAGGACCGCTACCCGCTCCGCACGTCGCCTCAGTGGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CGCACGCTCCTCGAGGGCAGCNNGTTTGCCGTCCACCACGAGGAGGAGGAGGTCAAGGTCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         TCGCAGGCGCTCACGGCTCTNACGGTCGAGGCCATGGTCGGCCACGCCGCCTCGTTCCAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           GCCGTCTCCGCCTCGATGGCCGACCCTCGCTCTGCACGACGCACACATGCTCTCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GTNCACGTNNTNCACGAGGGCANNGAGAAGATCATGTNCGCCCGCGAGGCGATCGCGCTC
                                                                                                                                            ACGACCGAGTCCAACGACGTCCTTCTCTCCTCCTCGCCACCCCACCTCTACTGCGTTCTC
                                                                                                                                                                                                                CAGCCGGCTGAGATGGCGAACCAGGCGGTCAACTCGCTTGCGCTCATCTCGGCTCGTCGC
                                                                                                                                                                                                                                             CAGCCGGCNGAGATGGGCAACCAGGCCGTCAACTCGCTCGCNCTCATCTCGGCNCGCCGC
                                                                                                                                                                                                                                                                                                                                                     CCCTCCTGCCTCGCGGCCGAAGACCCCCTCGCTCTCCTACCACTGCAAGGGCCTCGACATC
                                                                                                                                                                                                                                                                                                                                                                                                                           GGCAAGCTCAACTTCACGCAGCTCACCGAGATGCTCAACGCCGGCATGAACCGCGGCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           TTCCAGGCTGCCGCTGTGGCCAACACCATGGAGAAGACTCGCCTCGGGCTCGCCCAGATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              TCGACGACCGACAACCCTCTCATCGACGTCGAGAACAAGACTTCGCACCACGGCGGCAAT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GACGACGAGGGCATTCTCCGCCAGGACCGCTACCCCTTGCGCACGTCTCCTCAGTGGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CGCAAGCTCCTCGAGGGAAGCCGCTTTGCTGTCCACCATGAGGAGGAGGTCAAGGTCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CCCTTCCTTCACGACGTCACGCGCCCTCACCCGACGCAGATCGAAGTCGCGGGAAACATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 CONTTCCTCCACGACGTCACGCCCCTCACCCGACCCAGATCGAGGTCGCGCGCAACATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       GCCGTCTCAGCATCGATGGCCACCCTCGCTCTGCACGACGCACACATGCTCTCGCTCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   GGCGACCTCTCCCCNCTCTCNTACATCGCCGCCGCCATCACCGGTCACCCGGACNNCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      TCGCAGTCGCTCACGGCCATGACGGTCGAAGCGATGGTCGGCCACGCCGGCTCGTTCCAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           TTCAACCTCGAGCCCGTCGTCCTCGGCCCGAAGGAAGGTCTCGGTCTCGTCAACGGCACC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        TINGGTCTCGAGCCCGTCGTCCTCGGCCCGAAGGAGGGTCTCGGTCTCGTCAACGGCACG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             GTGCACGTCGTCCACGAGGGCAAGGAGAAGATCCTGTACGCCCGCGAGGCGATGGCGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GGCGACCTCTCTCTCTCTCTACATTGCAGCGGCCATCAGCGGTCACCCGGACAGCAAG
                                                                                                         1680
                                                                                                                                                                                                                                                                                                                                                                                      1440
                                                                                                                                          1596
                                                                                                                                                                           1620
                                                                                                                                                                                                                1536
                                                                                                                                                                                                                                                 1560
                                                                                                                                                                                                                                                                                1476
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1320
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1236
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1260
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1200
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1116
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1140
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1020
                                                                       1656
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1296
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1176
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1056
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1080
                                                                                                                                                                                                                                                                                                                                                      1416
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                996
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   936
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      960
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       876
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        900
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           816
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            840
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               780
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      636
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             756
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  696
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   720
```

В Ş

Ş В 밁 δÕ 밁 Š 뮹 Ϋ́ 밁

Ś

망 Ş 밁 Ś 밁 Ş 밁 Ś

Š

```
RESULT 6
AAN81101
ID AAN8
XX
Ş
                                                                                                                                                                                                             Ç
                                                                                                                                                                                                                                           В
                                                                                                                                                                                                                                                           S
                                                                                                                                                                                                                                                                            밁
                                                                                                                                                                                                                                                                                          5
                                                                                                                                                                                                                                                                                                             В
                                                                                                                                                                                                                                                                                                                          5
                                                                                                                                                                                                                                                                                                                                            В
                                                                                                                                                                                                                                                                                                                                                            Ş
                                                                                                                                                                                                                                                                                                                                                                               당
                                                                                                                                                                                                                                                                                                                                                                                            Ş
                                                                                                                                                                                                                                                                                                                                                                                                                문
                                                                                                                                                                                                                                                                                                                                                                                                                            5
                                                                                                                                                                                                                                                                                                                                                                                                                                                뫄
                                                                                                                                                                                                                                                                                                                                                                                                                                                              5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  망
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                g
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Дb
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  δ
                                                                                                                 27-AUG-2003
25-MAR-2003
19-NOV-1990
                                                                                                                                                                   AANBI 01
                      17-AUG-1988.
                                                                                         Sequence encoding L-phenylalanine turoloides.
       08-FEB-1988;
                                         EP278706-A
                                                        Rhodosporidium
                                                                          Cinnamic acid;
                                                                                                                                                   AAN81101;
                                                                                                                                                                                                                                                             2341
                                                                                                                                                                                                                                                                              2246
                                                                                                                                                                                                                                                                                             2281
                                                                                                                                                                                                                                                                                                              2186
                                                                                                                                                                                                                                                                                                                               2221
                                                                                                                                                                                                                                                                                                                                               2126
                                                                                                                                                                                                                                                                                                                                                                                2066
                                                                                                                                                                                                                                                                                                                                                                                                 2101
                                                                                                                                                                                                                                                                                                                                                                                                                 2006
                                                                                                                                                                                                                                                                                                                                                                                                                                  2041
                                                                                                                                                                                                                                                                                                                                                                                                                                                  1946
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1777
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1717
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1741
                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1981
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1886
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1921
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1837
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1801
                                                                                                                                                                                                                            2401 NNNANAA 2408
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1861
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              NIGTCCTCGCCNNINGCCANNAGGTCTCGCTCGCNGCCGTCAACGCCTGGAAGGTCGCCT
                                                                                                                                                                                                                                                                                                                            NNICCHNINININCTITTINGININT CGINITCHTCHCHINININCGGANITINICHINCHININININ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CTCGTCGAGAAGGTGAACAAGACGCTCGCCAAGCGCCTCGAGCAGACCAACTCGTACGAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   CTCGNGGACAAGGTCAACAAGNCGCTCNACAAGCGNCTCGAGAAGACCAACTCGTACGAC 1800
                                                                                                                                                                                                                                                                                                              TATCCCGCCTGCACTCTTAGGACTCGCTTCTTGTCGGACTCGGGATCTCGCATCGCTTCTT
                                                                                                                                                                                                                                                                                                                                                                                                                           TCCGCGAGGAGCTCGGCGTCAAGGCCCCGCCGCCGGCGACGTCTTCCCTCGGCAAGCAGGAGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                  CGACCTCGTCGCCCCCCCTCTCGTACCTCTCGCCGCGCACTCAGATCCTCTACGCCTTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                             CTCGAGCCGCGCTGGCACGACGCCTTCTCGTTCGCGACCGGCACCGTCGTCGCGACNNNNNN
                                                                                                                                                                   standard;
                                                                                                                                                                                                                                             AGTACCCATCCACGCATCCGATAAATCAGGGAGAGAATCTACGCTTGCGGGAGCTTCTTG
                                                                                                                                                                                                                                                             NGTHINICANNIACNCUTNINNINNAMICNGGNANNGANTINIANGNITNCGNGNINCHINNINN
                                                                                                                                                                                                                                                                              TCGTTCTTGGCTGCCTCTC-TAGACCGTGTCCGTATTACCTCGAGATTGTGAATACAAGC
                                                                                                                                                                                                                                                                                              TINININCITINICTCNCINNINANCINIGTCINTININININCTUNIGINITINININININCININC
                                                                                                                                                                                                                                                                                                                                                ACGTCCTCCTCAAGATGCTCGCTTAGACACTCTTCCCACTCTCGCATCCCTTCCATACCC
                                                                                                                                                                                                                                                                                                                                                               ACGTCCTCGTCAAGATGCTCGCNTAGNNNCNCNNNCNANNCTCGCNTNNNNNCCNNNCNC
                                                                                                                                                                                                                                                                                                                                                                                 TGACGATCGGCTCGAACGTCTCCAAGATCTACGAGGCCATCAAGTCGGGCAGGATCAACA
                                                                                                                                                                                                                                                                                                                                                                                                TGACGATCGGCACCAACGTCTCCCGCATCTACGAGGCCATCAAGNNCGGCNGCATCAACC
                                                                                                                                                                                                                                                                                                                                                                                                                  CCGCCGAGTCGGCCATCTCGCTCACCCGCCAAGTCCGCGAGACCTTCTGGTCCGCCGCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   CCGCCGAGAAGGCCATCTCGCTCACGCGCNANGTCCGCGACNCCTTCTGGNCGGCNCCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    TCGTCGACGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CGCATAAA 2372
                                                                                                                 (revised)
(revised)
(first entry)
                                                                          expression
       88EP-00301011.
                                                          toruloides
                                                                                                                                                                   DNA;
                                                                                                                                                                   2331
                                                                           vector;
                                                                                                                                                                   ₽₽
                                                                           ş
                                                                                                   ammonia
                                                                          10414 FerumP-8876; pYtrp6; ss
                                                                                                  lyase
                                                                                                  (PAL)
                                                                                                   from Rhodosporidium
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1980
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1885
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1920
                                                                                                                                                                                                                                                                                                                2245
                                                                                                                                                                                                                                                                                                                                                2185
                                                                                                                                                                                                                                                                                                                                                                2220
                                                                                                                                                                                                                                                                                                                                                                                  2125
                                                                                                                                                                                                                                                                                                                                                                                                 2160
                                                                                                                                                                                                                                                                                                                                                                                                                  2065
                                                                                                                                                                                                                                                                                                                                                                                                                                   2100
                                                                                                                                                                                                                                                                                                                                                                                                                                                    2005
                                                                                                                                                                                                                                                                                                                                                                                                                                                                   2040
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1945
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1836
                                                                                                                                                                                                                                                                                                                                                                                                  Ş
                        밁
                                        Ş
                                                         В
                                                                      Ş
                                                                                         Вb
                                                                                                        5
                                                                                                                           밁
                                                                                                                                          á
                                                                                                                                                           용·정
                                                                                                                                                                                            밁
                                                                                                                                                                                                           Ş
                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                           Ş
                                                                                                                                                                                                                                                               В
                                                                                                                                                                                                                                                                             Ş
                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                              Š
                                                                                                                                                                                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                                                                             δ
                                                                                                                                                                                                                                                                                                                                                                Query Match Best Local Simi
                                                                                                                                                                                                                                                                                                                                                                                                  Sequence 2331
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Example; Fig 2(A)-2(D); 37pp; English
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Recombinant plasmid
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      (MITK ) MITSUI
                                                                                                                                                                                                                                                                                                                                                                          Local Similarity
         601
                         517
                                          541
                                                           457
                                                                           481
                                                                                           397
                                                                                                           421
                                                                                                                            337
                                                                                                                                           361
                                                                                                                                                             277
                                                                                                                                                                            301
                                                                                                                                                                                             218
                                                                                                                                                                                                             241
                                                                                                                                                                                                                              161
                                                                                                                                                                                                                                              181
                                                                                                                                                                                                                                                               101
                                                                                                                                                                                                                                                                               121
                                                                                                                                                                                                                                                                                               61
                                                                                                                                                                                                                                                                                                               61
                                                                                                                                                                                                                                                                                                                                 ш
                                                                                                                                                                                                                                                                                                                                                ы
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             combined promoter
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      'n
                                                                                                                                                                                                                                                                                                                                                                                                  BP; 426 A;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       TOATSU CHEM INC.
                                                                                                                                                                                                                                                                                                                                                                         67.8%
80.4%
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ś
                                                                                                                                                                                                                                                                                                                                                                                                              rect PR field.) (Undated on 27
                                                                                                                                                                                                                                                                                                                                                                                                  888
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Sone
                                                                                                                                                                                                                                                                                                                                                                 0;
                                                                                                                                                                                                                                                                                                                                                                                                  C; 592
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      S
                                                                                                                                                                                                                                                                                                                                                                  Mismatches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Nakaj ima
                                                                                                                                                                                                                                                                                                                                                                                                  G; 425
                                                                                                                                                                                                                                                                                                                                                                                                   Η.
```

06-FEB-1987; 18-JUN-1987; 87JP-00024705. 87JP-00152357. for expression of L-phenylalanine ammonia-lyase - moter of tac promoter and Pl promoter for enhanced Ķ Makiguchi z

Plasmids were from E.coli MT 10414 (FermP-8876) carrying the plasmid pYtrp6 contg. the structural gene for PAL from Rhodosporidium toruloides. Inventors claim a recombinant plasmid contg. a DNA sequence coding for PAL with the SQ in AAP80501. Procedure for cloning the structural gene for PAL (AAR8101) is described as a reference example. The hybrid plasmid permits more efficient expression of PAL in E.coli. PAL is used for the prodn. of L-phenylalanine from cinnamic acid and ammonia (Updated on 25-WAR-2003 to correct PR field.) (Updated on 27-AUG-2003 to correct OS field.)

c G 0 Other;

Score 1677.4; DB 1; Pred. No. 1.6e-225; Indels Length 2331; 36; o,

CACGCCGNNCCGNCNNNGNCGNCNACGGGGGGGCGACGTCACNCTCNGNCGGCGNCGCNG ATGGCACCCTCGACTCGATCTCGCACTCGTTCGCAAACGGCGTCGCATCCGCAAAG ATGGCCCCCTCCNTCGACTCGATCGCGACCTCGNTCGCCAACGGCNTCNCNAACGGNTNG - CAATGGCGCCTCGACCAACCTC----GCAGTCGCAG 100 120 60 60

GCTCGCTCCTCCCGACCACACNIGACGCAGCTCGACATCGTNGAGAAGATCCTCGCCG 180

GCTCGCACCTGCCCACAACCCAGGTCACGCAGGTCGACATCGTCGAGAAGATGCTCGCCG

ACCCCACCGNNACGNACGNNNTCGAACTCGACGGGTACACCCTCACCCTCGGNGACGTCG

TCGGCGCCGCNCGCAAGGGCCGCNCNGTCCGCGTCNCAGACAGNCGACGAGATCCGCGCA cocceacceacresa---cocresaacresacescracrescresaceressasseres

TCTCGGCCGCGAGGAAGGGCAGGCCTGTCCGCGTCAAGGACAG - CGÁCGÁGÁTCCGCTCA

276

300

217 240 160

AAGATCGACAANAGNGTCGAGTTCCTCCGNNCNCAGCTCNACAACAGNGTCTACGGNGTC

ACGACTGGTTTCGGCCGGCTCGGCCGACACCCCGGACTGAGGATGCNATCTCGCTCCAGAAG AAGATTGACAAATCGGTCGAGTTCTTGCGCTCGCAACTCTCCATGAGCGTCTACGGCGTC

420

336 360

GCNCTCCTCGAGCACCAGCTCTGCGGTGTNCTCCCNACGTCGNTCGANTCCTTCNGCCTC ACGACTGGATTTGGCGGATCCGCAGACACCCGCACCGAGGACGCCATCTCGCTCCAGAAG GCTCTCCTCGAGCACCAGCTCTGCGGTGTTCTCCCTTCGTCGTTCGACTCGTTCCGCCTC 456 480 396

GGCCGCGGTCTCGAGAACTCGCTTCCCCTCGAGGTTGTTCGCGGCGCCATGACAATCCGC GGNCGCGCCTCGAGAACTCGCTTCCGCTCGAGGTCGTCCGCGGCGCCATGACCATCCGC 516 54C

GTCAACTCGCTCACNCGCGGCCACTCGGCNGTCCGCCTCGTCGTCGTCGAGGCGCTCACC AACTTCCTCAACCACGGCATCACCCCCATCGTCCCCCTCCGGGGCACCATCTCGGGGTTCG 660 600

맑

8 8

```
1117
                                                                                                                     1537
                                                                                                                                                                                                1477
                                                                                                                                                                                                                                     1501
                                                                                                                                                                                                                                                                            1417
                                                                                                                                                                                                                                                                                                                1441
                                                                                                                                                                                                                                                                                                                                                       1357
                                                                                                                                                                                                                                                                                                                                                                                           1381
                                                                                                                                                                                                                                                                                                                                                                                                                                  1297
                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1321
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1237
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1261
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1177
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1201
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1141
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1057
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1081
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1021
                                                                               1621
                                                                                                                                                          1561
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          997
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   937
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        961
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              877
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     901
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       817
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                841
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  697
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           637
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          577
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    757
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         781
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      721
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          GGCCCGCTCGTCAGCGACATGATTCACGCCCACGCNGTCCTCTCGCTCGAGGCCGGNCAG 1200
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                GGCGACCTCTCCCCCCCTCTCATACATCGCCGCCCCATCACCGGTCACCCGGACNNCAAG
CAGGCCGTCGACCTCCGCGCGATGGAGTTCGAGTTCAAGAAGCAGTTCGACCCGNTNNTC
                                                                                                                                                                                                                                                                                                                                                                             CONTCCTGCCTGCCTGCCGAGGACCONTCGCTCTCCTATCACTGCAAGGGCCTCGACATT 1440
                                                                                                                                                                                                                                                                                                                                                                                                                                                      GGCAAGCTCAACTTCACGCAGCTCACCGAGATGCTCAACGCCGGCATGAACCGCGGCCTN 1380
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      GACGACGAGGGCATTCTCCGCCAGGACCGCTACCCGCTCCGCACGTCGCCTCAGTGGCTC 1140
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CGCACGCTCCTCGAGGGCAGCNNGTTTGCCGTCCACCACGAGGAGGAGGAGGTCAAGGTCAAG 1080
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           GTNCACGTNNTNCACGAGGGCANNGAGAAGATCATGTNCGCCCGCGAGGCGATCGCGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           GGCGACCTCTCTCTCTCTACATTGCAGCGGCCATCAGCGGTCACCCGGACAGCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      AACTTCCTCAACCACGGCATCACCCCCCATCGTCCCCCTCCGCGGCACCATCTCTGCGTCG
                                                                                                                                          GCCGCNGCNGCNTACACTTCGGAGCTCGGNCACCTTGCCAACCCGGTNACGACCCACGTC 1500
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          TCGACGACCGACAACCCTCTCATCGACGTCGAGAACAAGACTTCGCACCACGGCGCGAT 1236
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 TCGACGACCGACACCCGCTCATCGACGTCGAGAACAAGANGACCCACCACGACGGCGCAAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      GACGACGAGGGCATTCTCCGCCAGGACCGCTACCCCTTGCGCACGTCTCCTCAGTGGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   CCCTTCCTTCACGACGTCACGCCCCTCACCCGACGCAGATCGAAGTCGCGGGAAACATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              TCGCAGTCGCTCACGGCCATGACGGTCGAAGCGATGGTCGGCCACGCCGGCTCGTTCCAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           TINGGICICGAGCCCGICGTCCTCGGCCCGAAGGAGGGICTCGGICTCGTCAACGGCACG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GTGCACGTCGTCCACGAGGGCAAGGAGAAGATCCTGTACGCCCGCGAGGCGATGGCGCTC
                                                                                                                     ACGACCGAGICCAACGACGICCTTTCTCTCTCCTCCTCGCCACCCACCTCTACTGCGTTCTC
                                                                                                                                                                                                CAGCCGGCTGAGATGGCGAACCAGGCGGTCAACTCGCTTGCGCTCATCTCGGCTCGTCGC
                                                                                                                                                                                                                                   CAGCCGGCNGAGATGGGCAACCAGGCCGTCAACTCGCTCGCNCTCATCTCGGCNCGCCGC 1560
                                                                                                                                                                                                                                                                              eccecreceeceracaccicedaerieeeacacciceccaaccciereaceacecarere
                                                                                                                                                                                                                                                                                                                                                     CCCTCCTGCCTCGCGGCCGAAGACCCCCTCGCTCTCCTACCACTGCAAGGGCCTCGACATC
                                                                                                                                                                                                                                                                                                                                                                                                                                    GGCAAGCTCAACTTCACGCAGCTCACCGAGATGCTCAACGCCGGCATGAACCGCGGCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               TTCCAGGCTGCCGCTGTGGCCAACACCATGGAGAAGACTCGCCTCGGCTCGCCCAGATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CGCAAGCTCCTCGAGGGAAGCCGCTTTGCTGTCCACCATGAGGAGGAGGTCAAGGTCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 TCGCAGGCGCTCACGGCTCTNACGGTCGAGGCCATGGTCGGCCACGCCGGCTCGTTCCAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GCCGTCTCAGCATCGATGGCCACCCTCGCTCTGCACGACGCACACATGCTCTCGCTCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    TTCAACCTCGAGCCCGTCGTCCTCGGCCCGAAGGAAGGTCTCGGTCTCGTCAACGGCACC
                                                                                                                     1596
                                                                                                                                                                                                                                                                              1476
                                                                                                                                                                                                                                                                                                                                                         1416
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1296
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1260
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1176
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1116
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1056
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1020
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              900
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         840
                                                                                                                                                                                                   1536
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     966
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                936
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     960
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         876
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    816
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  756
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      780
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             696
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          636
```

```
RESULT 7
AAN81116
ID AAN8
Ş
                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                              Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                  , B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ď,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ď.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                5
                                                                                                                                                                                                                             24-OCT-2003
25-MAR-2003
12-NOV-1990
                                                                                                                                                                                                                                                                                                          AAN8)/116
18-FEB-1988;
                      24-AUG-1988.
                                               EP279665-A.
                                                                                                                                      Rhodosporidium toruloides; (IFO 559)
                                                                                                                                                                L-phenylalanine ammonialyase; PAL; foreign gene culture temperature; expression regulation; ss.
                                                                                                                                                                                                      L-phenylalanine ammonialyase structural gene
                                                                                                                                                                                                                                                                                 AAN81116;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1777
                                                                                                                                                                                                                                                                                                                                                                                                                         2246 TCGTTCTTGGCTGCCTCTC-TAGACCGTGTCGGTATTACCTCGAGATTGTGAATACAAGC 2304
                                                                                                                                                                                                                                                                                                                                                                                                                                                   2281
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             2126
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      2161
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               2066
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       2101
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 2006
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         2041
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1946
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1981
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1886
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1921
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1837
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1861 NNGTCCTCGCCNNNNGCCANNAGGTCTCGCTCGCNGCCGTCAACGCCTGGAAGGTCGCCT 1920
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1741
                                                                                                                                                                                                                                                                                                                                                                        2305 AGTACCCATCCA 2316
                                                                                                                                                                                                                                                                                                                                                                                                 2341 NGTNNNCANNNA 2352
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     NUNCCINNINNINNICTITTINGININTCGINITCHTGINCHININNINCGGAINTINICHINCHININNIN 2280
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            ACGTCCTCGTCAAGATGCTCGCNTAGNNNCCNCNNCNANNCTCGCNTNNNNNNCCCNNNCNC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               TGACGATCGGCACCAACGTCTCCCGCATCTACGAGGCCATCAAGNNCGGCNGCATCAACC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     TCCGCGAGGAGCTCGGCGTCAAGGCCCGCGGGGACGTCTTCCTCGGCAAGCAGGAGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  TCGTCGACGTC-----GCTCTCGCTCGCTCGCCGTCAACGCCTGGAAGGTCGCCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CTCGAGCCGCGCTGGCACGACGCCTTCTCGTTCGCGACCGGCACCGTCGTCGAGNNNNNN 1860
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CTCGTCGAGAAGGTGAACAAGACGCTCGCCAAGCGCCTCGAGCAGACCAACTCGTACGAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CTCGNGGACAAGGTCAACAAGNCGCTCNACAAGCGNCTCGAGCAGACCAACTCGTACGAC
                                                                                                                                                                                                                                                                                                          standard; DNA; 2331
                                                                                                                                                                                                                                                                                                                                                                                                                                                   THNNNCHTNNCTINICTCNCNNNNANCNNGTCNNTNNNNNCTNNNGNNTNNNNNNNNCNNNC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                           TATCCCGCCTGCACTCTTAGGACTCGCTTCTTGTCGGACTCGGATCTCGCATCGCTTCTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               TGACGATCGGCTCGAACGTCTCCAAGATCTACGAGGCCATCAAGTCGGGCAGGATCAACA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 CGACCTCGTCGCCCGCGCTCTCGTACCTCTCGCCCCCACTCAGATCCTCTACGCCTTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           cercercerceccecercneeracercreecececececercereracreerree
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   CCGCCGAGTCGGCCATCTCGCTCACCCGCCAAGTCCGCGAGACCTTCTGGTCCGCCGCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       crearecedescaceaceacerrerectresecedescacesresecenes
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            ACGTCCTCAAGATGCTCGCTTAGACACTCTTCCCACTCTCGCATCCCTTCCATACCC
                                                                                                                                                                                                                                                                                                                    (revised)
(revised)
(first entry)
88EP-00301356.
                                                                                    /*tag=
                                                                                                   Location/Qualifiers
1. .2151
                                                                          /product= "PAL"
                                                                                                                                                                             expression;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1776
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                2185
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                2125
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         2160
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           2040
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1945
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1885
                                                                                                                                                                                                                                                                                                                                                                                                                                                                              2245
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        2220
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 2065
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           2100
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    2005
                                                                                                                                                                                                                                                                                                                                                                                                                                                      2340
```



Ş 밁 Š 뮍 Ś 밁 Ş 밁 Ş 밁 Ş 밁 Ş 밁 Ś В Ş 밁 5 В Ś 밁 50 В 8 밁 Š В S Вb Ş 뮍 á

밁

1657

GTCTCGCTCATCGACCAGCACTTTGGCTCCGCCATGACCGGCTCGAACCTGCGCGCGACGAG 1716

```
문
               5
                                              당
                                                                   δ
                                                                                        В
                                                                                                              5
                                                                                                                                           8
8
                                                                                                                                                                                         В
                                                                                                                                                                                                                 5
                                                                                                                                                                                                                                           占
                                                                                                                                                                                                                                                               Š
                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                 S
                                                                                                                                                                                                                                                                                                                                            В
                                                                                                                                                                                                                                                                                                                                                                Ş
                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                 8
                                                                                                                                                                                                                                                                                                                                                                                                                                           B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Matches 1891;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Query Match
Best Local
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               The cloned DNA from pSW13 isolated from the cloned cell carrying pSW13 was digested with various restriction endonucleases. The sequences from the fragments were analysed by the method of Maxam-Gilbert and also by biochemical means using the method of Maat. The sequences obtained were edited using the GENAS program produced by Mitsui Information Development Co. The sequence so determined is represented here. The regulation of expressiom of this foreign gene in E.coli carrying a recombinant plasmid comprises maintaining the culture at at least 40 deg. C. See also Ep-279664. (Updated on 25-MAR-2003 to correct PR field.) (Updated on 25-MAR-2013 to correct PR field.)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Disclosure;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Sequence
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       19-FEB-1987;
18-JUN-1987;
517
                    541
                                                457
                                                                       481
                                                                                               397
                                                                                                                                               337
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1988-236895/34.
                                                                                                                       421
                                                                                                                                                                      361
                                                                                                                                                                                               277
                                                                                                                                                                                                                       301
                                                                                                                                                                                                                                               218
                                                                                                                                                                                                                                                                       241
                                                                                                                                                                                                                                                                                                161
                                                                                                                                                                                                                                                                                                                                               101
                                                                                                                                                                                                                                                                                                                                                                       121
                                                                                                                                                                                                                                                                                                                       181
                                                                                                                                                                                                                                                                                                                                                                                                61
                                                                                                                                                                                                                                                                                                                                                                                                                      61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                      μ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Similarity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                MITSUI
                                                                                                             GCNCTCCTCGAGCACCAGCTCTGCGGTGTNCTCCCNACGTCGNTCGANTCCTTCNGCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                2331
              GTCAACTCGCTCACNCGCGGCCACTCGGCNGTCCGCCTCGTCCTCCGAGGCGCTCACC
                                                 GGCCGCGGI
                                                              GGNCGCGGCCTCGAGAACTCGCTTCCGCTCGAGGTCCTCCGCGGGGCGCCATGACCATCCGC
                                                                                                GCTCTCCTCGAGCACCAGCTCTGCGGTGTTCTCCCTTCGTCGTTCGACTCGTTCCGCCTC
                                                                                                                                                                  ACGACTGGTTTCGGCGGCTCGGCCGACACCCCGGACTGAGGATGCNATCTCGCTCCAGAAG
                                                                                                                                                                                               AAGATTGACAAATCGGTCGAGTTCTTGCGCTCGCAACTCTCCATGAGCGTCTACGGCGTC
                                                                                                                                                                                                                        AAGATCGACAANAGNGTCGAGTTCCTCCGNNCNCAGCTCNACAACAGNGTCTACGGNGTC
                                                                                                                                                                                                                                               TCTCGGCCGAGGAAGGGCAGGCCTGTCCGCGTCAAGGACAG-CGACGAGATCCGCTCA
                                                                                                                                                                                                                                                            TCGGCGCCCGCAAGGGCCGCNCNGTCCGCGTCNCAGACAGNCGACGAGATCCGCGCA
                                                                                                                                                                                                                                                                                                CGCCGACCGACTCGA---CGCTCGAACTCGACGGCTACTCGCTCAACCTCGGAGACGTCG
                                                                                                                                                                                                                                                                                                                    ACCCCACCGNNACGNACGNNNTCGAACTCGACGGGTACACCCTCACCCTCGGNGACGTCG
                                                                                                                                                                                                                                                                                                                                                GCTCGCACCTGCCCACAACCCAGGTCACGCAGGTCGACATCGTCGAGAAGATGCTCGCCG
                                                                                                                                                                                                                                                                                                                                                                GCTCGCTCCCCGACCACCCAGNNGACGCAGCTCGACATCGTNGAGNAGATCCTCGCCG
                                                                                                                                                                                                                                                                                                                                                                                                CAGGCTGT--
                                                                                                                                                                                                                                                                                                                                                                                                                      CACGCCGNNCCGNCNNNGNCGNCNACGGGCGCCACGTCCACNCTCNGNCGGCCGNCGCNG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                      ATGGCCCCTCCNTCGACTCGATCGCGACCTCGNTCGCCAACGGCNTCNCNAACGGNTNG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              67.8%; nilarity 80.4%; Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               of expression g temp. of cult
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     ); 36pp;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              temp.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                BP;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Yoshino
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                TOATSU
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       87JP-00034397
87JP-00152359
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 426
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      English.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ŝ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               culture
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              A; 888
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CHEM
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               of foreign
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Yamamoto
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               0
                                                                                                                                                                                                                                                                                                                                                                                               ----CAATGGCGCCTCGACCAACCTC----GCAGTCGCAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Pred. No. 1.6e
0; Mismatches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Score
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              ņ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                592
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ζ,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1677.4;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              deg. C or more to suppress
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              G; 425 T; 0 U; 0 Other;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Sone
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1.6e-225;
nes 425;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       DB
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Suzuki
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              suppress
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       3
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Nakajima
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               36;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               expression
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           γģ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ۲,
                    600
                                              516
                                                                       540
                                                                                                                                                396
                                                                                                                                                                      420
                                                                                                                                                                                               336
                                                                                                                                                                                                                                                                       300
                                                                                                                                                                                                                                                                                                                      240
                                                                                                                                                                                                                                                                                                                                               160
                                                                                             456
                                                                                                                                                                                                                                                                                                                                                                      180
                                                                                                                                                                                                                                                                                                                                                                                             100
                                                                                                                                                                                                                                                                                                                                                                                                                      120
                                                                                                                                                                                                                                                                                                                                                                                                                                               60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                      60
          뮍
                          8
                                                           В
                                                                           Ş
                                                                                                         ₽
                                                                                                                              Ś
                                                                                                                                                           밁
                                                                                                                                                                             Ş
                                                                                                                                                                                                          뫄
                                                                                                                                                                                                                            Ş
                                                                                                                                                                                                                                                      밁
                                                                                                                                                                                                                                                                             5
                                                                                                                                                                                                                                                                                                         B
                                                                                                                                                                                                                                                                                                                            δ
                                                                                                                                                                                                                                                                                                                                                         g
                                                                                                                                                                                                                                                                                                                                                                               8
                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                           8
                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ď,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                             5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       망
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          맑
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               8
          1597
                                   1621
                                                                                                                                                           1417
                                                                                                                                                                                                            1357
                                                                                                                                                                                                                                                           1297
                                                                                                                                                                                                                                                                                   1321
                                                                                                                                                                                                                                                                                                          1237
                                                                                                                                                                                                                                                                                                                                                          1177
                                                                                                                                                                                                                                                                                                                                                                                                           1117
                                                                                                                                                                                                                                                                                                                                                                                                                                  1141
                                                                                                                                                                                                                                                                                                                                                                                                                                                           1057
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1081
                                                                                                                                                                                                                                                                                                                                   1261
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1021
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          997
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           937
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 961
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          877
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  901
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          817
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  841
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           757
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           697
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  781
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 721
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           637
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 661
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          577
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  601
                           CAGGCCGTCGACCTCCGCGCGATGGAGTTCGAGTTCAAGAAGCAGTTCGACCCGNTNNTC
                                                                                                                                                                          GCCGCNGCNGCNTACACTTCGGAGCTCGGNCACCTTGCCAACCCGGTNACGACCCACGTC
                                                                           CCNTCCTGCCTGCCGAGGACCCNTCGCTCTCTCTATCACTGCAAGGGCCTCGACATT
          CAAGCCATCGACTTGCGCGCGATCGAGTTCGAGTTCAAGAAGCAGTTCGGCCCAGCCATC
                                                                                                            CAGCCGGCTGAGATGGCGAACCAGGCGGTCAACTCGCTTGCGCTCATCTCGGCTCGTCGC
                                                                                                                                  CAGCCGGCNGAGATGGGCAACCAGGCCGTCAACTCGCTCGCNCTCATCTCGGCNCGCCGC
                                                                                                                                                            ĠĊĊĠĊŢĠĊĠĠĊĠŢĂĊĂĊĊŢĊĠĠĀĠŢŢĠĠĠĄĊĂĊĊŢĊĠĊĊĂĂĊĊĊŢĠŢĠĂĊĠĀĊĠĊĀŢĠŢĊ
                                                                                                                                                                                                                                                           GGCAAGCTCAACTTCACGCAGCTCACCGAGATGCTCAACGCCGGCATGAACCGCGGCCTC
                                                                                                                                                                                                                                                                           GGCAAGCTTCACGCAGCTCACCGAGATGCTCAACGCCGGCATGAACCGCGGCCTN
                                                                                                                                                                                                                                                                                                           TTCCAGGCTGCCGCTGTGGCCAACACCATGGAGAAGACTCGCCTCGGGCTCGCCCAGATC
                                                                                                                                                                                                                                                                                                                              TCGACGACCACCACCGCTCATCGACGTCGAGAACAAGANGACCCACCACGGCGGCAAC
                                                                                                                                                                                                                                                                                                                                                                                                                                 gecceerreareacearatearreaceceaegenerecrereereageceeneae
                                                                                                                                                                                                                                                                                                                                                                                                                                                           GACGACGAGGGCATTCTCCGCCAGGACCGCTACCCCTTGCGCACGTCTCCTCAGTGGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GACGACGAGGGCATTCTCCGCCAGGACCGCTACCCGCTCCGCACGTCGCCTCAGTGGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CGCACGCTCCTCGAGGGCAGCNNGTTTGCCGTCCACCACGAGGAGGAGGAGGTCAAGGTCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 controcrocaceacercacececcroaceceaacecaearceaeercececeaearcare
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  TCGCAGGCGCTCACGGCTCTNACGGTCGAGGCCATGGTCGGCCACGCCGGCTCGTTCCAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          GCCGTCTCCGCCTCGATGGCGACCCTCCCCTCTGCACGACGCACACATGCTCTCCTCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             TINGGTCTCGAGCCCGTCGTCCTCGGCCCGAAGGAGGGTCTCGGTCTCGTCAACGGCACG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 GINCACCINNINCACGAGGGCANNGAGAAGAICAIGINCGCCCGCGAGGCGAICGCGCIC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            GGCGACCTCTCCCCNCTCTCNTACATCGCCGCCGATCACCGGTCACCCGGACNNCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          AACTTCCTCAACCACGGCATCACCCCCATCGTCCCCCTCCGCGGCACCATCTCGGCGTCG
                                                                                                                                                                                                                                                                                                                                                                                                            CGCAAGCTCCTCGAGGGAAGCCGCTTTGCTGTCCACCATGAGGAGGAGGTCAAGGTCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          GCCGTCTCAGCATCGATGGCCACCCTCGCTCTGCACGACGCACACATGCTCTCGCTCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            TTCAACCTCGAGCCCGTCGTCCTCGGCCCGAAGGAAGGTCTCGGTCTCGTCAACGGCACC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           GGCGACCTCTCTCTCTCTACATTGCAGCGGCCATCAGCGGTCACCCGGACAGCAAG
                                                                                                                                                                                                                                    1440
                                                                                                                                                                                                                                                           1356
                                                                                                                                                                                                                                                                                                           1296
                                                                                                                                                                                                                                                                                                                                                                                   1260
                                                                                                                                                                                                                                                                                                                                                                                                                                                           1116
                                    1680
                                                                                    1620
                                                                                                            1536
                                                                                                                                    1560
                                                                                                                                                            1476
                                                                                                                                                                                   1500
                                                                                                                                                                                                            1416
                                                                                                                                                                                                                                                                                   1380
                                                                                                                                                                                                                                                                                                                                                          1236
                                                                                                                                                                                                                                                                                                                                                                                                                                  1200
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1140
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1056
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1080
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1020
                                                             1596
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           996
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           936
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  960
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            876
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   900
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            816
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   840
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 780
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          756
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           696
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           636
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  660
```

```
Ś
                                                                                                                                                                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                                                                                                                                       Ş
                                                                                                                                                                                                                                                                                                                                                                                               B
                                                                                                                                                                                                                                                                                                                                                                                                                 Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     맑
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Š
                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        В
                                                                                                                                                            Sequence of Rhodosporidium toruloides IFO Phenylalanine ammonia lyase (PAL).
             EP260919-A
                                                        misc_feature
                                                                                                                Rhodosporidium
                                                                                                                                      Aspartame;
                                                                                                                                                                                                 12-DEC-1990
                                                                                                                                                                                                                                              AAN81399
                                                                                                                                                                                                                                                                                                       2305
                                                                                                                                                                                                                                                                                                                           2341
                                                                                                                                                                                                                                                                                                                                                                         2281
                                                                                                                                                                                                                                                                                                                                                                                               2186
                                                                                                                                                                                                                                                                                                                                                                                                                      2221
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          2066
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               2101
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1946
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1981
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1886
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1921
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1837
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1777
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1801
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1717
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1741
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1657
                                                                                                                                                                                                                                                                                                                                                                                                                                                                   2161
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        2006
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              2041
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1861
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1681
                                                                                                                                                                                                                                             standard; cDNA; 2328
                                                                                                                                                                                                                                                                                                                                                                                                                  NNNCCMNNNNNNCTHTINGNNNTCGNNTCNTGNCNNNNNNCGGANNTNNCNNCNNNNNNN
                                                                                                                                                                                                                                                                                                                                                                                                                                                        ACGTCCTCGTCAAGATGCTCGCNTAGNNNCNCNNNCNANNCTCGCNTNNNNNCCNNNCNC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             NNGTCCTCGCCNNNNGCCANNAGGTCTCGCTCGCNGCCGTCAACGCCTGGAAGGTCGCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CTCGAGCCGCGCTGGCACGCCTTCTCGTTCGCGACCGGCACCGTCGTCGAGNNNNNN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CTCGTCGAGAAGACGAACAAGACGCCTCGCCAAGCCCTCGAGCAGCAGCCAACTCGTACGAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               TCCGCGAGGAGCTCGGCGTCAAGGCCCGCCGCCGCCGACGTCTTCCTCGGCAAGCAGGAGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CCGCCGAGAAGGCCATCTCGCTCACGCGCNANGTCCGCGACNCCTTCTGGNCGGCNCCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             TCGTCGACGTC----
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CTCGNGGACAAGGTCAACAAGNCGCTCNACAAGCGNCTCGAGCAGACCAACTCGTACGAC 1800
                                                                                                                                                                                                                                                                                                       AGTACCCATCCA
                                                                                                                                                                                                                                                                                                                             NGTNNNCANNNA
                                                                                                                                                                                                                                                                                                                                                   TCGTTCTTGGCTGCCTCTC-TAGACCGTGTCGGTATTACCTCGAGATTGTGAATACAAGC
                                                                                                                                                                                                                                                                                                                                                                         TNININCITUNCTONCONNINANCINGTONITUNININCTUNIGINITUNININININCININC
                                                                                                                                                                                                                                                                                                                                                                                               TATCCCGCCTGCACTCTTAGGACTCGCTTCTTGTCGGACTCGGATCTCGCATCGCTTCTT
                                                                                                                                                                                                                                                                                                                                                                                                                                            ACGTCCTCCAAGATGCTCGCTTAGACACTCTTCCCACTCTCGCATCCCTTCCATACCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          TGACGATCGGCTCGAACGTCTCCAAGATCTACGAGGCCATCAAGTCGGGCAGGATCAACA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              TGACGATCGGCACCAACGTCTCCCGCATCTACGAGGCCATCAAGNNCGGCNGCATCAACC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CGACCTCGTCGCCCGCGCTCTCGTACCTCTCGCCGCGCACTCAGATCCTCTACGCCTTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CGTCGTCGTCGCCGCGCTCNCGTACCTCTCGCCGCGCACGCGCGTCCTGTACTCGTTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                ccecceaerceeccarcicecreacceeccaaercceceaeaccricieerceeccecer
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CTCGTCCCGCGCTGGCACGACGCCTTCTCCTTCGCCGGCACCGTCGTCGAGGTCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    GTCTCGCTCATCGÁCCÁGCÁCTTTGGCTCCGCCATGACCGGCTCGAACCTGCGCGACGÁG
                                                                                                                                      artificial sweetener;
                                                                                                                                                                                                (first entry)
                                                                                                                   toruloides.
                                                        /*tag= a
1. .2148
                                   /*tag= b
/note= "Claimed'
                                                                                         location/Qualifiers
                                                                                .2151
                                                                                                                                                                                                                                                                                                       2316
                                                                                                                                                                                                                                                                                                                             2352
                                                                     D
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             -----GCTCTCGCTCGCCGCCGTCAACGCCTGGAAGGTCGCCG
                                                                                                                                                                                                                                              В₽
                                                                                                                                       enzyme;
                                                                                                                                                                          559
                                                                                                                                                                          cells
                                                                                                                                                                          CDNA
                                                                                                                                                                        encoding
                                                                                                                                                                                                                                                                                                                                                    2304
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1945
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1885
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1920
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1836
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1776
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1740
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   2005
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         2040
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1980
                                                                                                                                                                                                                                                                                                                                                                                                                      2280
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         2125
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               2160
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       2065
                                                                                                                                                                                                                                                                                                                                                                         2340
                                                                                                                                                                                                                                                                                                                                                                                                2245
                                                                                                                                                                                                                                                                                                                                                                                                                                            2185
                                                                                                                                                                                                                                                                                                                                                                                                                                                                   2220
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             2100
```

```
8
                                                                                                                                                                                                                                                                                                                                                                                                                 δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               맑
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     B
                                                                                                                                                                          밁
                                                                                                                                                                                                               δ
                                                                                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                                                                                     Ś
                                                                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Query Match
Best Local Similarity
Matches 1890; Conserv
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Fukuhara I
Suzuki M,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       PAL is useful in prodn. of L-phenylalanine from cinnamic acid and an NH3 donor (process claimed). L-Phe is an essential AA and starting material for sweetener aspartame. E.coli transformants will produce PAL without induction by expensive AAs, no surfactant is needed to increase cell wal
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Sequence 2328 BP; 423 A; 889 C; 591 G; 425 T; 0 U; 0 Other;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Disclosure; 9; 37pp; English.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 New L-phenylalanine ammonia lyase and encoding DNA sequence -producing L-phenylalanine from cinnamic acid and ammonia.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           WPI; 1988-079223/12.
P-PSDB; AAP81099.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              23-MAR-1988
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           (MITK ) MITSUI TOATSU CHEM INC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             16-SEP-1986;
                                                                                                                                                                                                                                                                                                                                                                               337
                                                                                                                                                                                                                                                                                                                                                                                                                            361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  161
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   101
                                                                                                                             541
                                                                                                                                                                             457
                                                                                                                                                                                                                               481
                                                                                                                                                                                                                                                                              397
                                                                                                                                                                                                                                                                                                                             421
                                                                                                                                                                                                                                                                                                                                                                                                                                                                             277
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 218
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               a N, Yoshino
M, Makiguchi
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 GCTCGCTCCTCCCGACCAGNNGACGCAGCTCGACATCGTNGAGNAGATCCTCGCCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                ATGGCCCCCTCCNTCGACTCGATCGCGACCTCGNTCGCCAACGGCNTCNCNAACGGNTNG
                                                                                                                                                                                                                                                                                                                                                                                                                         ACGACTGGTTTCGGCGGCTCGGCCGACACCCGGACTGAGGATGCNATCTCGCTCCAGAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  AAGATCGACAANAGNGTCGAGTTCCTCCGNNCNCAGCTCNACAACAGNGTCTACGGNGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CGCCGACCGACTCGA----CGCTCGAACTCGACGGCTACTCGCTCAACCTCGGAGACGTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  ACCCCACCGNNACGNACGNNNTCGAACTCGACGGGTACACCCTCACCCTCGGNGACGTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CAGGCTGT-----GCAGTCGCACCAACCTC----GCAGTCGCAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 CACGCCGNNCCGNCNNGNCGNCNACGGGCGCCACGTCCACNCTCNGNCGGCCGNCGCNG
AACTTCCTCAACCACGGCATCACCCCCATCGTCCCCCTCCGCGGGCACCATCTCGGCGTCG
                                                                                                                                                                                                                                                                              ecrerecredade a de la constanta de la contracta                                                                                                                                                                                                                                                                                                                GCNCTCCTCGAGCACCAGCTCTGCGGTGTNCTCCCNACGTCGNTCGANTCCTTCNGCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ATGGCACCCTCGCTCGACTCGATCTCGCACTCGCTCGCAAACGGCGTCGCATCCGCAAAG
                                                                            ercaacaecricacceceeccacricescrerececcicercerceaeecercacc
                                                                                                                           GTCAACTCGCTCACNCGCGGCCACTCGGCNGTCCGCCTCGTCGTCCTCGAGGCGCTCACC
                                                                                                                                                                                                               GGNCGCGGCCTCGAGAACTCGCTTCCGCTCGAGGTCCGCCGCGGCGCCATGACCATCCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   TCGGCGCCGCNCGCAAGGGCCGCNCNGTCCGCGTCNCAGACAGNCGACGAGATCCGCGCA
                                                                                                                                                                                  GGCCGCGGTCTCGAGAACTCGCTTCCCCTCGAGGTTGTTCGCGGCGCGCCATGACAATCCGC
                                                                                                                                                                                                                                                                                                                                                                               ACGACTGGATTTGGCGGGATCCGCAGACACCCGCACCGAGGACGCCATCTCGCTCCAGAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                <u>AAGATTGACAAATCGGTCGAGTTCTTGCGCTCGCAACTCTCCATGAGCGTCTACGGCGTC</u>
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 TCTCGGCCGCGAGGAAGGGCCAGGCCTGTCCGCGTCAAGGACAG-CGACGAGATCCGCTCA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             86JP-00215864.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               87EP-00308119
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    67.7%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       z o
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Yamamoto
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 0;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Score 1675.8; DB 1; Length Pred. No. 2.7e-225; O; Mismatches 426; Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            ×
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Se
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ή
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Sone
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               ູເດ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Nakajima
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    36;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   2328;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            useful
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ۲
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              for
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   180
                                                                                                                                                                                                                                                                                                                                                                                                                                 420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    120
                                                                                   576
                                                                                                                                600
                                                                                                                                                                                  516
                                                                                                                                                                                                                                 540
                                                                                                                                                                                                                                                                                   456
                                                                                                                                                                                                                                                                                                                                                                                  396
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   336
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 276
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     217
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   160
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    100
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   60
                                  660
                                                                                                                                                                                                                                                                                                                                  480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       9
```

```
1597
                                                                                                                     1621
                                                                                                                                                           1537
                                                                                                                                                                                                   1561
                                                                                                                                                                                                                                          1477
                                                                                                                                                                                                                                                                              1501
                                                                                                                                                                                                                                                                                                                        1417
                                                                                                                                                                                                                                                                                                                                                            1441
                                                                                                                                                                                                                                                                                                                                                                                                     1357
                                                                                                                                                                                                                                                                                                                                                                                                                                           1381
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1297
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1321
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1237
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1177
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1201
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1117
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1141
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1057
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1261
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1081
1657
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1021
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         997
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        937
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            961
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    877
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           901
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 817
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     841
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                757
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        781
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 697
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       721
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             637
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      661
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            577
                                                                                                                                                                                                                                                                                                                                                                                                   CONTCCTGCCTGCCTGCCGAGGACCONTCGCTCTCCTATCACTGCAAGGGCCTCGACATT 1440
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 GCCGTCTCCGCCTCGATGGCGACCCTCGCTCTGCACGACGCACACATGCTCTCGCTCCTCCTC
GTCTCGCTCATCGACCAGCACTTTGGCTCCGCCATGACCGGCTCGAACCTGCGCGACGAG
                         CAGGCCGTCGACCTCCGCGCGATGGAGTTCGAGTTCAAGAAGCAGTTCGACCCGNTNNTC
                                                                                                                                                         CAGCCGGCNGAGATGGGCAACCAGGCCGTCAACTCGCTCGCTCGCNCTCATCTCGGCNCGCCGC
                                                                                                                                                                                                                                                                                                                        GCCGCTGCGGCGTACACCTCGGAGTTGGGACACCTCGCCAACCCTGTGACGACGCATGTC
                                                                                                                                                                                                                                                                                                                                              GCCGCNGCNGCNTACACTTCGGAGCTCGGNCACCTTGCCAACCCGGTNACGACCCACGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 GGCAAGCTCAACCTCACGCAGCTCACCGAGATGCTCAACGCCGGCATGAACCGCGGCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           GGCAAGCTCAACTTCACGCAGCTCACCGAGATGCTCAACGCCGGCATGAACCGCGGCCTN 1380
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     TTCCAGGCGNCCGCTGTCGCNAACACGATGGAGAAGACTCGCCCTCGCNCTCGCCCTGATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      TCGACGACCGACACCCGCTCATCGACGTCGAGAACAAGANGACCCACCACGACGAGGAAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GGCCCGCTCGTCAGCGACATGATTCACGCCCACGCNGTCCTCTCGCTCGAGGCCGGNCAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          GACGACGAGGGCATTCTCCGCCAGGACCGCTACCCCCTTGCGCACGTCTCCTCAGTGGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GACGACGAGGGCATTCTCCGCCAGGACCGCTACCCGCTCCGCACGTCGCCTCAGTGGCTC 1140
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CONTINCTCCACGACGTCACGGCCCTCACCCGACTCGAGGTCGAGGTCGCGCGAACATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  TINGGTCTCGAGCCCGTCGTCCTCGGCCCGAAGGGTCTCGGTCTCGTCAACGGCACG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      GTNCACGTNNTNCACGAGGGCANNGAGAAGATCATGTNCGCCCGCGAGGCGATCGCGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       GGCGACCTCTCCCCCNTACATCGCCGCCGCCATCACCGGTCACCCGGACNNCAAG
                                                                                CAAGCCATCGACTTGCGCGCGATCGAGTTCGAGTTCAAGAAGCAGTTCGGCCCAGCCATC
                                                                                                                                                                                                                                            CAGCCGGCTGAGATGGCGAACCAGGCGGTCAACTCGCTTGCGCTCATCTCGGCTCGTCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  TTCCAGGCTGCCGCTGTGGCCAACACCATGGAGAAGACTCGCCTCGGGCTCGCCCAGATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             TCGACGACCGACCACCTCTCATCGACGTCGAGAACAAGACTTCGCACCACGGCGGCAAT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  TTCAACCTCGAGCCCGTCGTCCTCGGCCCGAAGGAAGGTCTCGGTCTCGTCAACGGCACC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 GGCGACCTCTCTCTCTCTCTACATTGCAGCGGCCATCAGCGGTCACCCGGACAGCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            AACTTCCTCAACCACGGCATCACCCCCATCGTCCCCCCTCCGCGGCACCATCTCTGCGTCG
                                        1740
                                                                                                                                                                                                   1620
                                                                                                                                                                                                                                            1536
                                                                                                                                                                                                                                                                                1560
                                                                                                                                                                                                                                                                                                                                                               1500
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1356
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1296
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1320
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1236
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1260
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1176
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1200
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1116
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1056
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1080
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1020
                                                                              1656
                                                                                                                     1680
                                                                                                                                                             1596
                                                                                                                                                                                                                                                                                                                        1476
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        966
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    936
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           960
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   876
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       900
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                816
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        840
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              756
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     780
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             696
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            636
RESULT 9
ABAS5240
ABAS5240
ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABAS
AC ABA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               뮵
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    $
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           멍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  å
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
24-JUL-2001; 2001WO-US023270
                                        31-JAN-2002
                                                                                WO200208402
```

```
2341
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1717
2305
                                                                                                                    2186
                                                                                                                                                                                                           2161
                                                                                                                                                                                                                                        2066
                                                                                                                                                                                                                                                                    2101
                                                                                                                                                                                                                                                                                                   2006
                                                                                                                                                                                                                                                                                                                                2041
                                                                                                                                                                                                                                                                                                                                                            1946
                                                                                                                                                                                                                                                                                                                                                                                                                         1886
                                                                                                                                                                                                                                                                                                                                                                                                                                                    1921
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1837
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1861
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1777
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1801
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1741
                                                                                                                                                                                           ACGTCCTCGTCAAGATGCTCGCNTAGNNNCNCNNNCNANNCTCGCNTNNNNNCCCNNNCNC
                                                                                                                                                                                                                                        TGACGATCGGCTCGAACGTCTCCAAGATCTACGAGGCCATCAAGTCGGGCAGGATCAACA
                                                                                                                                                                                                                                                                                                                                                                                                                                        CCGCCGAGAAGGCCATCTCGCTCACGCGCCNANGTCCGCGACNCCTTCTGGNCGGCNCCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        AGTACCCATCCA
                           NGTNNNCANNNA
                                                                                                                   TATCCCGCCTGCACTCTTAGGACTCGCTTCTTGTCGGACTCGGATCTCGCATCGCTTCTT
                                                                                                                                                NNNCCHNNNNNNCTNTTNGNNNTCGNNTCNTGNCNNNNNCGGANNTNNCNNCNNNNNNN
                                                                                                                                                                                                                                                            TGACGATCGGCACCAACGTCTCCCGCATCTACGAGGCCATCAAGNNCGGCNGCATCAACC
                                                                                                                                                                                                                                                                                                                    TCCGCGAGGAGCTCCGGCGTCAAGGCCCGCCGCGGCGAGCGTCTTCCTCCGGCAAGCAGGAGG
                                                                                                                                                                                                                                                                                                                                                            CCGCCGAGTCGGCCATCTCGCTCACCCGCCAAGTCCGCGAGACCTTCTGGTCCGCCGCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    NNGTCCTCGCCNNNNNGCCANNAGGTCTCGCTCGCNGCCGTCAACGCCTGGAAGGTCGCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 CTCGAGCCGCGCTGGCACGACGCCTTCTCGTTCGCGACCGGCACCGTCGTCGAGNNNNNN
                                                           TOGTTOTTGGOTGCOTOTO-TAGACOGTGTOGGTATTACOTOGAGATTGTGAATACAAGO
                                                                                    THINNICHTHICTUNCTCHCHNINALCHIGTCHNTHINNINCTHNINGHNTHINNINHNCHNIC
                                                                                                                                                                            ACGTCCTCAAGATGCTCGCTTAGACACTCTTCCCACTCTCGCATCCCTTCCATACCC
                                                                                                                                                                                                                                                                                                    TCGTCGACGTC-----GCTCTCGCTCGCCGCCGTCAACGCCTGGAAGGTCGCCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CTCGTCCCGCGCTGGCACGCCTTCTCCTTCGCCGCCGCACCGTCGTCGAGGTCCTC
                           2352
2316
                                                                                                                                                                                                                                                                                                                                 2100
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1885
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1920
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1836
                                                           2304
                                                                                        2340
                                                                                                                    2245
                                                                                                                                                 2280
                                                                                                                                                                              2185
                                                                                                                                                                                                            2220
                                                                                                                                                                                                                                         2125
                                                                                                                                                                                                                                                                        2160
                                                                                                                                                                                                                                                                                                      2065
                                                                                                                                                                                                                                                                                                                                                                2005
                                                                                                                                                                                                                                                                                                                                                                                           2040
                                                                                                                                                                                                                                                                                                                                                                                                                         1945
                                                                                                                                                                                                                                                                                                                                                                                                                                                      1980
```

```
PAL; yeast; cytostatic;
                                                                                                                        Rhodotorula graminis.
                                                                                                                                                                                                                                            10-JUN-2002
                                                                                                                                                                                                                                                                                                               ABA95240
                                                                                                                                                                                                         graminis PAL polypeptide
                                                                                                                                                                                                                                                                                                               standard;
                                                                                                                                                        phenylalanine ammonia lyase; cinnamic acid; cinnamate; anti-HIV; virucide; nootropic; dermatological; gene th
                                                                                                                                                                                                                                            (first
                                                      37. .2199
/*tag= a
/transl_except= (pos: 493. .495, aa: Xa
/note= "Xaa = Val or Ala"
/product= "phenylalanine ammonia lyase"
                                                                                   Location/Qualifiers
                                                                                                                                                                                                                                                                                                                 cDNA;
                                                                                                                                                                                                                                                                                                                 2419
                                                                                                                                                                                                           encoding
                                                                                                                                                                                                                                                                                                                 ВÞ
                                                                                                                                                                                                             CDNA.
```

음 상 음

Š

5 B 5 B

성 음 성

40 40 40

S B S

A A

성 유

8 8

8 8 8 8 8 8

660

```
Matches 1878;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Query Match
Best Local Similarity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      The invention relates to an isolated and purified yeast phenylalanine ammonia lyase (PAI) polypoptide. The PAI encoding polynucleotide or a host cell comprising the polynucleotide is useful for the production of I-PAI, by adding the polynucleotide or the host cell to a composition comprising trans-cinnamic acid, or trans-cinnamate and ammonia; and for improving the production of PAI, its analog or another optically active unnatural amino acid having PAI-like structure. The PAI polynucleotides are useful for treating a mammal having a disease, disorder or condition selected from phenylketonuria, cancer, human immunodeficiency virus infection and human cytomegalovirus infection. The present sequence represents a R. gramminis PAI polypeptide encoding cDNA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Phenylalanine ammonia lyase polypeptide and polynucleotide useful treating mammal having disease or disorder from phenylketonuria, human immunodeficiency virus infection and human cytomegalovirus
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Sequence 2419 BP; 416 A; 909 C; 659 G; 434 T; 0 U; 1 Other;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Claim
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            P-PSDB;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         24-JUL-2000;
                                 541
                                                                                                                                            481
                                                                                                                                                                                                      451
                                                                                                                                                                                                                                                                                                                       391
                                                                                                                                                                                                                                                                                                                                                                              361
                                                                                                                                                                                                                                                                                                                                                                                                                                        331
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         272
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          215
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 2002-268973/31.
                                                                                                                                                                                                                                                                421
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          37
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      97
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ...
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           RK,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     PCBU
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Fig 2; 135pp; English
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       TCGGCGCCGCNCGCAAGGGCCGCNCNGTCCGCGTCNCAGACAGNCGACGAGATCCGCGCA 300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ACCCCACCGNNACGNACGNNNTCGAACTCGACGGGTACACCCTCACCCTCGGNGACGTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GCTCGCTCCTCCGACCACCAGNNGACGCAGCTCGACATCGTNGAGNAGATCCTCGCCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ATGGCCCCCTCCNTCGACTCGATCGCGACCTCGNTCGCCAACGGCNTCNCNAACGGNTNG
                              GTCAACTCGCTCACNCGCGGCCACTCGGCNGTCCGCCTCGTCGTCCTCGAGGCGCTCACC
                                                                                                                          GGNCGCGGCCTCGAGAACTCCGCTTCCGCTCGAGGTCCGCCGCGGCGCCATGACCATCCGC
                                                                                                                                                                                                         GCGCTCATCGAGCACCAGCTCTGCGGCGTGACGCCGACGTCCGYCTCGTCCTTCAGCGTC
                                                                                                                                                                                                                                        GCNCTCCTCGAGCACCAGCTCTGCGGTGTNCTCCCNACGTCGNTCGANTCCTTCNGCCTC
                                                                                                                                                                                                                                                                                                                       ACCACGGGTTTCGGTGGCTCGGCCGACACGACGACTGAGGATGCAGTCAGCCTCCAGAAG
                                                                                                                                                                                                                                                                                                                                                               ACGACTGGTTTCGGCGGCTCGGCCGACACCCCGGACTGAGGATGCNATCTCGCTCCAGAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                        CGCGTCGACAAGAGCGTCGACTTCCTCAAGGCCCAGCTTCAGAACTCGGTCTACGGAGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            AAGATCGACAANAGNGTCGAGTTCCTCCGNNCNCAGCTCNACAACAGNGTCTACGGNGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          ACCCCACCGAC---GACGTCGTCGAGCTCAGCGGGTACAGCCTCACCGTCCGTGACGTTG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        GCCTCGATGGCCACGCCGCGCACCAGTCGCAGCTCGAGATCGTGCAGGAGCTCCTCAGCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CACGCCGCTCCGACCAAGTCGGCTGCGGGCCCCACTTCGGCTCTCCGCCGCACGC--CCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   CACGCCGNNCCGNCNNNGNCGNCNACGGGCGCCACGTCCACNCTCNGNCGGCCGNCGCNG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          ATGGCCCCTTCCTTGGACTCGCTCGCCACCACGCTCGCCAACGGCTTTACCAACGGCTCG
Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  SERVICES
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            2000US-00624693
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Kootstra
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                65.8%;
78.0%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1; Mismatches 504; Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Score 1629; DB 6;
Pred. No. 9.1e-219;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Length 2419;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           25;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   cancer,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    of
L
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                120
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         330
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         154
                                 600
                                                                                     570
                                                                                                                                               540
                                                                                                                                                                                                         510
                                                                                                                                                                                                                                                                480
                                                                                                                                                                                                                                                                                                                          450
                                                                                                                                                                                                                                                                                                                                                                                    420
                                                                                                                                                                                                                                                                                                                                                                                                                                        390
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       271
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        214
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          96
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           80
                                                                                                                                                                                                                                                                                                                                                                                                      Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               DP.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 멍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       g.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     B
      유 성
                                                                                                                밁
                                                                                                                                                              Š
                                                                                                                                                                                                                              B
                                                                                                                                                                                                                                                                            8
                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1171
                                                             1621
                                                                                                                       1588
                                                                                                                                                                              1561
                                                                                                                                                                                                                                    1528
                                                                                                                                                                                                                                                                                           1501
                                                                                                                                                                                                                                                                                                                                                     1468
                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1408
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1381
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1348
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1321
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1288
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1261
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1228
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1201
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1141
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1111
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1081
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1051
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1021
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       991
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     571
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              961
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        931
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            901
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      871
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                841
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    811
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         691
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    631
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              781
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        751
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            721
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             GACGACGAGGGCATTCTCCGCCAGGACCGCTACCCGCTCGCACGTCGCCTCAGTGGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GCCGTCTCCGCCTCGATGGCGACCCTCGCTCTGCACGACACACATGCTCTCGCTCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       GGCGACCTCTCCCCNCTCTCNTACATCGCCGCCGCCATCACCGGTCACCCGGACNNCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        GTCAACTCGCTCACGCGTGGCCACTCGGCCGTCCGCCTCGTCCTTGAGGCGCTCACC
                                    CAGGCCGTCGACCTCCGCGCGATGGAGTTCGAGTTCAAGAAGCAGTTCGACCCGNTNNTC
                                                                                                                                                                                                                                                                                                                                                                                                      GCCGCNGCNGCNTACACTTCGGAGCTCGGNCACCTTGCCAACCCGGTNACGACCCACGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               GECAAGCTCAACTTCACGCAGCTCACCGAGATGCTCAACGCCGGGCATGAACCGCGGCCTN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          TTTGGTCTCGAGGCAGTCGTCCTCGGCCCGAAGGAGGGTCTCGGTCTGGTCAACGGAACG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           TINGGICICGAGCCCGICGICCICGGCCCGAAGGAGGGICICGGICICGGICAACGGCACG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        GTTCACGTTTTGCACGAGGAACCGAGAAGATCATGTTTGCGCGCGAGGCCATCTCGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            GINCACGINNINCACGAGGGCANNGAGAAGAICAIGINCGCCCGCGAGGCGAICGCGCIC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       AACTICTIGAACCACCGCATCACGCCCATCGTCCCCCCTCCGCGGCTCCATCTCGGCGTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           ACNGCCGAGGCCAACGACGICCTTTCTCTCCTCCTCGCCACCCACCCTCTACTGCGTNCTC
                                                                                                                                                                                                                                                                         CAGCCGGCNGAGATGGGCAACCAGGCCGTCAACTCCGCTCGCNCTCATCTCGGCNCGCCGC
                                                                                                                                                                                                                                                                                                                                                     CACATCGCTGATTACGCTTCGGAGCTCGGCCACCTTGCCAACCCGGTCACTACCTTCGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             CONTCCTGCCTCGCCGAGGACCCNTCGCTCTCCTATCACTGCAAGGGCCTCGACATT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        TTCCAGGCGTCGGCTGTCTCGATTTCGATGGAGAAGACCAGGCTCGCACTCGCCCTCATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       TTCCAGGCGNCCGCTGTCGCNAACACGATGGAGAAGACTCGCCCTCGCNCTCGCCCTGATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      ACGACGACCACAACCCGCTCCTCGACGTCGAGAACAAGCAGACCGCGCACGGCGCAAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          TCGACGACCGACACCCGCTCATCGACGTCGAGAACAAGANGACCCACCACGGCGGCAAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           GGCCCGCTCGTCAGCGACATGATTCACGCCCACGCNGTCCTCTCGCTCGAGGCCGGNCAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GACGACGAGGGCATTCTTCGCCAGGACCGCTACCCGCTCGCACGTCGCCTCAGTTCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CGCACGCTCCTTTCCGGCTCGTCGTTTGCCGTTGAGCACGAGGAGGAGGTCAAGGTCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CGCACGCTCCTCGAGGGCAGCNNGTTTGCCGTCCACCACGAGGAGGAGGTCAAGGTCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CCGTTCATCCACGACGTCTGCCGCCCCGCCACCCCGGCCAGGTCGAGGTCGCGCGCAACATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CONTTCCTCCACGACGTCACGCGCCCTCACCCGACCCAGATCGAGGTCGCGCGCAACATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            rcecaeececroaceecronaceerceaeeccareerceaeeccacecceecroerrccac
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GCCGTCTCCGCCTCGATGGCGACCCTCAGTCTGCACGACTCGCACATGCTCTCGCTCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            GGCGACCTCAGCCCGCTCTCGTACATCGCCGGCCCATCACCGGTCACCCCGACGTCAAG
                                                                                                                    ACTGCCGAGGCCAACGACGTCCTTTCTCTCCTTCTCGCCTCGCACCTGTACTGCACGCTC
                                                                                                                                                                                                                                        CCTTCGTGCCTGCCGAGGACCCGTCGCTCAACTATCACGGCAAGGGCTTGGACATT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       GGCAAGCTCAACTTCACGCAGTGCACCGAGTTGCTCAACGCTGCCATGAACCGCGGCCTG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       reseasse remainda de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea de la resea
```

1140

1170

1080

1020

930 960 990 900

690 720 750 780 780 810 840

1110

1287

1227

중 유

밁

8 8 8 8

유

1680

1440

1320 1347 1380 1407

1467

1527

1560

```
RESULT 10
AAD45812
ID AAD45
XX AAD45
AC AAD45
XX AD45
XX AD45
XX AD45
XX AD45
XX Cance
DE Rhodo
XX Yeast
KW Cance
XX Cance
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX AD45
XX 
                                                                                                                                      Yeast; phenylalanine ammonia lyase; PAL; EC 4.3.1.5; phenylketonuria; cancer; human immunodeficiency virus infection; HIV; gene therapy; hCMV; human cytomegalovirus infection; cytostatic; virucide; gene; ds.
                                                                                                                                                                                                                                                                                                                                                                               AAD45812
                                                                                                 Rhodotorula
                                                                                                                                                                                                                                        Rhodotorula
                                                                                                                                                                                                                                                                                     27-DEC-2002
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    2412
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                2353
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1756
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1741
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           2341
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          2293
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       2281
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    2233
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   2221
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                2174
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                2161
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             2114
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          2101
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         2054
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      2041
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1994
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1934
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1921
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1876
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1861
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1816
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1708
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1981
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1801
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1681
                                                                                                                                                                                                                                                                                                                                                                                 standard;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    AAAAAAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 NNNANAAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        NGTHNINCANNNACNCHTNINNNNNANNCNGGNANNGANTNNANGNNTNCGNGNNCNNNNNN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             THINNICITINICITCHCHININANCHNGTCHNTHINININCTHNINGHNTHINININHCHINIC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ACCCCAAGACCAGCTTTTCGACGTCGTGTCGTGCCAAGAACGGACTTTCCTCCATACACA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      TGACGATCGGCACCAACGTCTCCCGCATCTACGAGGCCATCAAGNNCGGCNGCATCAACC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       TCCGCGAGGAGCTCGGCGTCAAGGCCCGCCGCGGGACGTCTTCCTCGGCAAGCAGGAGGAGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    NNGTCCTCGCCNNNNGCCANNAGGTCTCGCTCGCNGCCGTCAACGCCTGGAAGGTCGCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 CTCGAGCCGCGCTGGCACGACGCCTTCTCGTTCGCGACCGGCACCGTCGTCGAGNNNNNN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          NNICCNNNNNNNCTWTTNGNNNTCGNNTCNTGNCNNNNNCGGANNTNNCNNCNNNNNNN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                ACGTCCTCGTCAAGATGCTCGCGTA-AGGCCCGAGCAAGCCTCGCCTAGACGCCCGCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             ACGTCCTCGTCAAGATGCTCGCNTAGNNNCNCNNNCNANNCTCGCNTNNNNNCCNNNCNC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             AGACGATCGGGAGCAACGTCTCGCGCATCTACGAGGCCATCAAGGACGGCCGCATCAACC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 CTTCGCAGGCGCCGCACGCATACCTCTCGCCGCGCACGCGCGTCCTGTACTCGTTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CGGCCGAGAAGGCCATCTCGCTCACGCGCGAGGTGCGCAACCGCTTCTGGCAGACGCCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CCGCCGAGAAGGCCATCTCGCTCACGCGCCNANGTCCGCGACNCCTTCTGGNCGGCNCCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            TCGTCCTCGCCCTCTGCCA--ACGTCACCCTTACTGCCGTCAACGCGTGGAAGGTTGCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      CTCGAGCCGCGCTGGCACGCCTTCTCGTACGCGACCGGCACCGTCGTCGAGCTCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CTTGCGCTCGAGGTCAAGAAGGCGCTCAACAAGCGTCTCGAGCAGACGACGACGTACGAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CTCGNGGACAAGGTCAACAAGNCGCTCNACAAGCGNCTCGAGCAGACCAACTCGTACGAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                GÉTICGTÉA-GTÁCACGTGTATAGAGCÉTGGAÁTGGATTGCÁAGTCTTCGAGTTCAAAAAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          TGTCGCCTTACTCTCGCCGTCATCACGTCTCTCAGTTCTTTCGTATCCCGCGTCTCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         TGCGCGAGGAGCTCGGCGTGCAGGCGCGCCGCGGCGACGTGTTTGTCGGCGTGCAGCAGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              cercercercecececronceracercececececacececerereracreerice
                                                                                              graminis
                                                                                                                                                                                                                                     graminis PAL DNA
                                                                                                                                                                                                                                                                                     (first entry
Location/Qualifiers
37. .2199
/*tag= a
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    2419
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   2408
                                                                                                                                                                                                                                                                                                                                                                                    DNA;
                                                                                                                                                                                                                                                                                                                                                                                    2419
                                                                                                                                                                                                                                        #1.
                                                                                                                                                                                                                                                                                                                                                                                 ВP
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   2411
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    2292
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1860
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           2400
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 2280
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             2220
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          2160
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       2113
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      2100
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1993
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1920
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1875
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1815
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        2352
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       2340
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                2232
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          2173
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   2053
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                2040
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1980
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1933
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1800
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1755
                                     S
                                                                                            맑
                                                                                                                                                                                      밁
                                                                                                                                                                                                                           δ
                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                        Ś
                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                                                                                         Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Š
    밁
                                                                                                                            Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Matches 1878;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Query Match
Best Local
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               The present invention relates to yeast (e.g. Rhodotorula) phenylalanine ammonia lyase (PAL; EC 4.3.1.5) proteins and polynucleotides encoding such proteins. PAL sequences are useful for producing L-phenylalanine. They are useful for treating mammals having diseases, disorders or conditions that would benefit from treatment with PAL proteins such as phenylketonuria, cancer, human immunodeficiency virus infection (HIV) or human cytomegalovirus (hCMV) infection. Sequences of the invention are also used in gene therapy. The present sequence is R. graminis PAL DNA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Novel isolated and purified Rhodotorula phenylalanine ammonia lyappolypeptide, useful for treating a mammal having phenylketonuria, human immunodeficiency virus or human cytomegalovirus infection.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Sequence 2419 BP; 416 A; 909 C; 659 G; 434 T; 0 U; 1 Other;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Claim
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             24-JUL-2000; 2000US-00624693.
24-JUL-2001; 2001WO-US023270.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  01-AUG-2002
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Yoshida
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                24-AUG-2001; 2001US-00939408
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               US2002102712-A1
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  (PCBU-) PCBU
                                               421
                                                                                              391
                                                                                                                                           361
                                                                                                                                                                                        331
                                                                                                                                                                                                                                                                                     272
                                                                                                                                                                                                                                                                                                                               241
                                                                                                                                                                                                                                                                                                                                                                                 215
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               2002-690616/74.
DB; AAE27938.
    451
                                                                                                                                                                                                                                     301
                                                                                                                                                                                                                                                                                                                                                                                                                              181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                             155
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       97
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 37
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    13; Page 27-29;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Н
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     RK,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Similarity
                                            generecregageaceaceacererecegrernerecenaceregnreganrecrrenecere
                                                                                                                                                                                                                      AAGATCGACAANAGNGTCGAGTTCCTCCGNNCNCAGCTCNACAACAGNGTCTACGGNGTC
                                                                                                                            ACGACTGGTTTCGGCGGCTCGGCCGACACCCCGGACTGAGGATGCCATCTCGCTCCAGAAG
                                                                                                                                                                                        CGCGTCGACAAGAGCGTCGACTTCCTCAAGGCCCCAGCTTCAGAACTCGGTCTACGGAGTC
                                                                                                                                                                                                                                                                                                                                  TCGGCGCCGCNCGCAAGGGCCGCNCNGTCCGCGTCNCAGACAGNCGACGAGATCCGCGCA
                                                                                                                                                                                                                                                                                                                                                                                                                              ACCCCACCGNNACGNACGNNNTCGAACTCGACGGTACACCCTCACCCTCGGNGACGTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                             GCCTCGATGGCCACGCCGCGCACCAGTCGCAGCTCGAGATCGTGCAGGAGCTCCTCAGCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        ectecetecteceaceaceaceanneacecaectecaeatestneaenaeatectecece
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CACGCCGCTCCGACCAAGTCGGCTGCGGGCCCCACTTCGGCTCTCCGCCGCACGC--CCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CACGCCGNNCCGNCNNNGNCGNCNACGGGCGCCACGTCCACNCTCNGNCGGCCGNCGCNG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              ATGGCCCCCTCCNTCGACTCGATCGCGACCTCGNTCGCCAACGGCNTCNCNAACGGNTNG
                                                                                                                                                                                                                                                                                       redececececadedecececage rececere - cacaaceaceaceae arecececa
                                                                                                                                                                                                                                                                                                                                                                                    ACCCCACCGAC--
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    ATGGCCCCTTCCTTGGACTCGCTCGCCACCACGCTCGCCAACGGCTTTACCAACGGCTCG
                                                                                                 <u>ACCACGGGTTTCGGTGGCTCGGCCGACACGAGGACTGAGG</u>
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  SERVICES
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Kootstra
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          /product= "PAL protein"
/EC_number= "4.3.1.5"
/transl_except= (pos:493. .
/note= "Xaa corresponds to
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  65.8%;
78.0%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 74pp;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  INC.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     AB
                                                                                                                                                                                                                                                                                                                                                                                    -GACGTCGTCGAGCTCAGCGGGTACAGCCTCACCGTCCGTGACGTTG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Score 1629; DB 6;
Pred. No. 9.1e-219;
1; Mismatches 504;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 English.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               .495, aa:Xaa)
Val or Ala"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Indels
                                                                                                 TGCAGTCAGCCTCCAGAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             2419;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              25;
```

Gaps

480 450 420 390 360 330 300 271 240 214 180 154 120 96 60 8 9

lyase

B Ş 유왕

Ş

40 40 40 40

Дb

Ş B Ş 밁 8 뭥 Ś 망

8 8

8

В Ş 멍 S 밁 Ś

Ş 망 Ś

CGC 540  CGC 540  CGC 570  ACC 630  ACC 750  ACC 750  ACC 750  ACC 960  CCTC 930  CCTC 1140  CCTC 1140  CCTC 1170  CCTC 1170  CCTC 1170  ACC 1287

Дb

Ş

밁

Š

밁 Ś

Para-hydroxycinnamic acid; PHCA; food packaging; electronic connector; phenylalanine ammonia lyase; PAL; glucose; tyrosine ammonia lyase; TAL Rhodotorula glutinis phenylalanine ammonia lyase (PAL) mutant DNA. 밁 Ş 맑 Š 밁 Ś 밁 Ş ₽ Ş 밁 á 멍 Ş ğ δ В

δõ

В

Š 밁 δõ В Ş 밁 8 멍

```
RESULT 11
AAD33076
ID AAD33076 standard; DNA; 2151 BP.
XX
AC AAD33076;
XX
DT 01-JUL-2002 (first entry)
XX
C Rhodotorula glutinis phenylalanine
XX
XX
XX
XX
XX
XX
Para-hydroxycinnamic acid; PHCA; 1
KW Phenylalanine ammonia lyase; PAL;
                                                                                                                                                                                                                                          Ş
                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                   Ş
                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                Ş
                                                                                                                                                                                                                                                                                                                                                                                                 B
                                                                                                                                                                                                                                                                                                                                                                                                                         Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                            멂
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      ğ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  ğ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Вb
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     ర్జ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Š
                                                                                                                                                                                                                  2412
                                                                                                                                                                                                                                                                               2353
                                                                                                                                                                                                                                                                                                                                        2293
                                                                                                                                                                                                                                                                                                                                                                     2281
                                                                                                                                                                                                                                                                                                                                                                                                   2233
                                                                                                                                                                                                                                                                                                                                                                                                                                2221
                                                                                                                                                                                                                                                                                                                                                                                                                                                              2174
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         2114
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       2101
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     2054
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  2041
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1994
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1981
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1934
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1921
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1876
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1861 NNGTCCTCGCCNNNNGCCANNAGGTCTCGCTCGCNGCCGTCAACGCCTGGAAGGTCGCCT 1920
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1816
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1801
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1756
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1741
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1708
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1681
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1648
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1621
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1588
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       AAAAAAA 2419
                                                                                                                                                                                                                                                NNNANAAA 2408
                                                                                                                                                                                                                                                                                                                                                                                                 ACCCCAAGACCAGCTTTTCGACGTCGTGTCGTGCCAAGAACGGACTTTCCTCCATACACA 2292
                                                                                                                                                                                                                                                                                                                                                                                                                         NNNCCNNNNNNNCTNTTNGNNNTCGNNTCNTGNCNNNNNNCGGANNTNNCNNCNNNNNNN 2280
                                                                                                                                                                                                                                                                                                                                                                                                                                                                              ACGTCCTCGTCAAGATGCTCGCNTAGNNNCNCNNNCNANNCTCGCNTNNNNNCCNNNCNC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      AGACGATCGGGAGCAACGTCTCGCGCATCTACGAGGCCATCAAGGACGGCCGCATCAACC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            TGACGATCGGCACCAACGTCTCCCCGCATCTACGAGGCCATCAAGNNCGGCNGCATCAACC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     TCCGCGAGGAGCTCGGCGTCAAGGCCCGCCGCGGCGACGTCTTCCTCGGCAAGCAGGAGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CGTCGTCGTCGCCGCGCTCCCGCACGCGCACGCGCGCGCCTCTGTACTCGTTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CTCGAGCCGCGCTGGCACGACGCCTTCTCGTTCGCGACCGGCACCGTCGAGNNNNNN 1860
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CTCGNGGACAAGGTCAACAAGNCGCTCNACAAGCGNCTCGAGCAGACCAACTCGTACGAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   CAGGCCGTCGACCTCCGCGCGATGGAGTTCGAGTTCAAGAAGCAGTTCGACCCGNTNNTC
                                                                                                                                                                                                                                                                                                           NGTININCAMMACNCNTININININAMNCNGGNAMNGANTINIANGMNTNCGNGMNCMMNNN 2400
                                                                                                                                                                                                                                                                                                                                          TGTCGCCTTACTCTCGCCGTCATCACGTCTCTCAGTTCTTTCGTATCCCGCGTCTCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     TGCGCGAGGAGCTCGGCGTGCAGGCGCGCGCGCGACGTGTTTGTCGGCGTGCAGCAGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               crredeadacecececacacarácerereacecececacacacarecreraciones
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CGGCCGAGAAGGCCATCTCGCTCACGCGCGAGGTGCGCAACCGCTTCTGGCAGACGCCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     ccgccgagaaggccarcrcgcrcacgcgcnangrccgcgacnccrrcrggncggcnccgr
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   TCGTCCTCGCCTCTGCCA--ACGTCACCCTTACTGCCGTCAACGCGTGGAAGGTTGCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CTCCAGCCGCGCTGGCACGACGCCTTCTCGTACGCGACCGGCACCGTCGTCGAGCTCCTC 1875
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CTTGCGCTCGAGGTCAAGAAGGCGCTCAACAAGCGTCTCGAGCAAGACGACGACGTACGAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CCGACTCTCCTCCAGCAGCACCTCGGCACTGGCCTCGACGTC------AACGCA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CAGGCCGTCGACCTCCGCGCGATGGAGCTCGACTTCAAGAAGCAGTTCGACCCGCTTCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         ACTGCCGAGGCCAACGACGTCCTTCTCTCTCTCGCCTCGCACCTGTACTGCACGCTC
                                                                                                                                                                                                                                                                             GGTCGTCA-GTACACGTGTATAGAGCCTGGAATGGATTGCAAGTCTTCGAGTTCAAAAAA
                                                                                                                                                                                                                                                                                                                                                                     THNINGCHTNINCTINICTCHCININNANCHNGTCHNTHNINNINCTHNINGHNTHNINHNINCHNINC 2340
                                                                                                                                                                                                                                                                                                                                                                                                                                                              ACGITCCTCGTCAAGATGCTCGCGTA-AGGCCCGAGCAAGCCTCGCCTAGACGCCCGCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1755
                                                                                                                                                                                                                                                                                  . 2411
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              2220
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       2160
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    2100
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             2040
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1993
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1980
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1933
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1815
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1800
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1707
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1680
                                                                                                                                                                                                                                                                                                                                                                                                                                                               2232
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          2173
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     2113
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                2053
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1647
                                                                                                                                                                                                                                                                                                                                           2352
```

```
Ş
                                      Вb
                                                                   Ş
                                                                                                     밁
                                                                                                                       S
                                                                                                                                                    뮹
                                                                                                                                                                                    Ś
                                                                                                                                                                                                                                                                             The invention relates to methods for biological production of paracchydroxycinnamic acid (PHCA). The invention relates to developing of a new CC biocatalyst for conversion of glucose to PHCA by incorporation of the CC wild type phenylalanine ammonia lyase (PAL; EC 4.3.1.5) from the yeast CC Rhodotorula glutinis into Escherichia coli underlying the ability of the wildtype PAL to convert tyrosine to PHCA. The invention is also directed to developing a new biocatalyst for conversion of glucose to PHCA by CC incorporation of the wildtype PAL which possesses enhanced tyrosine cammonia lyase (TAL) activity from the yeast Rhodotorula glutinis plus the plant cytochrome p-450 and the cytochrome p-450 reductase into S. coli. CC Nucleic acid encoding mutant TAL enzyme is useful for producing PHCA by crecombinant techniques. The recombinantly produced PHCA may be used as a monomer for production of liquid crystal polymers (LCP). LCP may be used in electronic connectors and telecommunication and aerospace applications. LCP resistance to sterilising radiation has also enabled these materials to be used in medical devices as well as chemical, and colling the productions. The present sequence is Rhodotorula glutinis
                                                                                                                                                                                                                      Matches 1829;
                                                                                                                                                                                                                                    Query Match
Best Local
                                                                                                                                                                                                                                                                             Sequence
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               polypeptide, or muta parahydroxycinnamic
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           27-JUL-2000;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Example 10; Page 95-98; 139pp;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       23-JAN-2001;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 WO200210407-A1
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Rhodotorula Synthetic.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           cytochrome p-450; cytochrome p-450 reductase; liquid crystal polymer; LCP; telecommunication; medical device; aerospace application; enzyme; biocatalyst; gene; mutant; variant; ds.
                   181
                                              101
                                                                         121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             nucleic acid encoding truncated mutant tyrosine ammonia lyase eptide, or mutant TAL polypeptide, useful for producing ydroxycinnamic acid in recombinant host cell lacking cinnamate
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     2002-280635/32
                                                                                                      61
                                                                                                                                61
                                                                                                                                                                                                                                    Similarity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                밁
                                                                                                                                                                              ATGGCCCCCTCCNTCGACTCGATCGCGACCTCGNTCGCCAACGGCNTCNCNAACGGNTNG
ACCCCACCGNNACGNACGNNTCGAACTCGACGGGTACACCCTCACCCTCGGNGACGTCG
                                                                                                                                CACGCCGNNCCGNCNNGNCGNCNACGGGCGCCACGTCCACNCTCNGNCGGCCGNCGCNG
                                                                                                                                                                                                                                                                             2151
                                              ĠĊĬĊĠĊĄĊĊĬĠĊĊĊĄĊĄĠĊĄĠĠŢĊĄĊĠĊĄĠĠĬĊĠĄĊĄĬĊĠĬĊĠĄĠĄĄĠĄĬĠĊĬĊĠĊĊĠ
                                                                        GCTCGCTCCCGACCACCCAGNNGACGCAGCTCGACATCGTNGAGNAGATCCTCGCCG
                                                                                                      CÁGGCTGT------CÁATGGCGCCTCGACCÁACCTC
                                                                                                                                                             ATGGCACCCTCGACTCGATCTCGCACTCGTTCGCAAACGGCGTCGCATCCGCAAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                PONT DE NEMOURS &
                                                                                                                                                                                                                      Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          2000US-00627216
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       2001WO-US002099
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Sariaslani
                                                                                                                                                                                                                                                                             BP;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1. .2151
/*tag= a
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           /product=
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Location/Qualifiers
                                                                                                                                                                                                                                                                             382
                                                                                                                                                                                                                               65.7%;
83.7%;
                                                                                                                                                                                                                                                                             Α,
                                                                                                                                                                                                                                                                             830
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Sa,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           "Rhodotorula
                                                                                                                                                                                                                  Score 1626.4; DB 6; Pred. No. 2.1e-218; 0; Mismatches 322;
                                                                                                                                                                                                                                                                             Ç
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Tang
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     English
                                                                                                                                                                                                                                                                             565
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ×
                                                                                                                                                                                                                                                                            <u>ن</u>
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   <u>۾</u>
                                                                                                                                                                                                                                                                             374 T; 0 U;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           glutinis mutant
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   WW.
                                                                                                                                                                                                                      Indels
                                                                                                                                                                                                                                                                             0
                                                                                                                                                                                                                                                Length
                                                                                                                                                                                                                                                                             Other;
                                                                                                      ----GCAGTCGCAG
                                                                                                                                                                                                                                               2151;
                                                                                                                                                                                                                     35;
                                                                                                      100
                                                                                                                                                            60
                240
                                              160
                   8
                                                          밁
                                                                                 δ
                                                                                                              맑
                                                                                                                                     δ
                                                                                                                                                                        뫄
                                                                                                                                                                                              δ
                                                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                        δ
                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                               Š
                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                        Š
                                                                                                                                                                                                                                                                                                                                                                                                          B
                                                                                                                                                                                                                                                                                                                                                                                                                                  Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                  맑
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           뭐
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             망
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             ф
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     맑
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                   1117
                              1261
                                                                                                                                                                           1057
                                                                                                                                                                                                     1081
                                                                                                                                                                                                                                                              1021
                                                                                                                                                                                                                                    997
                                                                                                                                                                                                                                                                                           937
                                                                                                                                                                                                                                                                                                                       961
                                                                                                                                                                                                                                                                                                                                                    877
                                                                                                                                                                                                                                                                                                                                                                                901
                                                                                                                                                                                                                                                                                                                                                                                                           817
                                                                                                                                                                                                                                                                                                                                                                                                                                       841
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           697
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     637
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              577
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        601
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     517
                                                                                                                                                                                                                                                                                                                                                                                                                                                                    757
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                781
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        721
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                661
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              457
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          481
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       397
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 421
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              337
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       277
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        161
                                                                                                                                      GGCCCGCTCGTCAGCGACATGATTCACGCCCACGCNGTCCTCTCGCTCGAGGCCGGNCAG
                                                                           TCGACGACCGACACCCGCTCATCGACGTCGAGAGAACAAGANGACCCACCACCACGGCGAAC
                                                                                                                                                                                               CCNTTCCTCCACGACGTCACGCGCCCTCACCCGACCCAGATCGAGGTCGCGCGCAACATC
                                                                                                                                                                                                                                                                                                                                                                                                                              GCCGTCTCCGCCTCGATGGCGACCCTCGCTCTGCACGACGCACACATGCTCTCGCTCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            GTNCACGTNNTNCACGAGGGCANNGAGAAGATCATGTNCGCCCGCGAGGCGATCGCGCTC
                             GACGACGAGGCATTCTCCGCCAGGACCGCTACCCCTTGCGCACGTCTCCTCAGTGGCTC
                                                                                                                                                                                                                                                              cecacecrecreaeeecaecnnerrreceerceaecaeeaeeaeeaeercaaeercaae
                                                                                                                                                                                                                                                                                           CCCTTCCTTCACGACGTCACGCGCCCTCACCCGACGCAGATCGAAGTCGCGGGAAACATC
                                                                                                                                                                                                                                                                                                                                                                     TCGCAGGCGCTCACGGCTCTNACGGTCGAGGCCATGGTCGGCCACGCCGGCTCGTTCCAC
                                                                                                                                                                                                                                                                                                                                                                                                           GCCGTCTCAGCATCGATGGCCACCCTCGCTCTGCACGACGCACACATGCTCTCGCTCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                TINGGTCTCGAGCCCGTCGTCCTCGGCCCGAAGGAGGGTCTCGGTCTCGTCAACGGCACG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           GTGCACGTCGTCCACGAGGGCAAGGAGAAGATCCTGTACGCCCGCGAGGCGATGGCGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GGCGACCTCTCTCTCTCCTACATTGCAGCGGCCATCAGCGGTCACCCGGACAGCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        GGCGACCTCTCCCCCCCTCTCTACATCGCCGCCGCCATCACCGGGTCACCCGGACCNCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              AACTTCCTCAACCACGGCATCACCCCCATCGTCCCCCCTCCGCGGCACCATCTCTGCGTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 AACTTCCTCAACCACGGCATCACCCCCCATCGTCCCCCCTCCGCGGCACCATCTCGGCGTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   GTCAACTCGCTCACNCGCGGCCACTCGGCNGTCCGCCTCGTCGTCGTCGAGGCGCTCACC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       GGNCGCGGCCTCGAGAACTCGCTTCCGCTCGAGGTCGTCCGCGGCGCCATGACCATCCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GCNCTCCTCGAGCACCAGCTCTGCGGTGTNCTCCCCNACGTCGNTCGANTCCTTCNGCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        ACGACTGGTTTCGGCGGCTCGGCCGACACCCGGACTGAGGATGCNATCTCGCTCCAGAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 TCGGCGCCGCNCGCAAGGGCCCGCNCNGTCCGCGTCNCAGACAGNCGAGACAGNCCGCGCCA
                                                                                                                                                                                                                                                                                                                                                      TCGCAGTCGCTCACGGCCATGACGGTCGAAGCGATGGTCGGCCACGCCGGCTCGTTCCAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                    TTCAACCTCGAGCCCGTCGTCCTCGGCCCGAAGGAGGGTCTCGGTCTCGTCAACGGCACC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GGCCGCGGTCTCGAGAACTCGCTTCCCCCTCGAGGTTGTTCGCGGCGCCATGACAATCCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       GCTCTCCTCGAGCACCAGCTCTGCGGTGTTCTCCCCTTCGTCGTTCGACTCGTTCCGCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                ACGACTGGATTTGGCGGATCCGCAGACACCCGCACCGAGGACGCCATCTCGCTCCAGAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  AAGATCGACAANAGNGTCGAGTTCCTCCGNNCNCAGCTCNACAACAGNGTCTACGGNGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CGCCGACCGACTCGA----CGCTCGAACTCGACGGCTACTCGCTCAACCTCGGAGACGTCG
                                                                                                                                                                           1116
                                                                                                                                                                                                       1140
                                                                                                                                                                                                                                    1056
                                                             1236
                                                                                                                                                1200
                                                                                                                                                                                                                                                                1080
                                                                                                                                                                                                                                                                                                                        1020
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 840
                                                                                                                                                                                                                                                                                           996
                                                                                                                                                                                                                                                                                                                                                      936
                                                                                                                                                                                                                                                                                                                                                                                 960
                                                                                                                                                                                                                                                                                                                                                                                                             876
                                                                                                                                                                                                                                                                                                                                                                                                                                       900
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           756
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        780
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     696
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              636
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        660
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     576
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       456
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              396
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                276
```

```
RESULT 12
AAD33100
ID AAD33
XX
AC AAD33
XX
DT 01-JU
XX
DZ R. gl
XX
XX
Para-
                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                        망
                                                                                                                                                                                                                                                                                   Ş
                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                          Š
                                                                                                                                                                                                                                                                                                                                                                             g
                                                                                                                                                                                                                                                                                                                                                                                                        Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                        B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           ğ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Вb
 Para-hydroxycinnamic acid; PHCA; food packaging; electronic connector;
                                                                                                                      AAD33100 standard;
                              glutinis phenylalanine ammonia lyase (PAL) mutant DNA,
                                                                                                                                                                                                                                                                                                                                                                                                                                         1886
                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1921
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1837
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1777
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1717
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1657
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1621
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1477
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1417
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1357
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1297
                                                                                                                                                                                                                            2161
                                                                                                                                                                                                                                                          2066
                                                                                                                                                                                                                                                                                     2101
                                                                                                                                                                                                                                                                                                                   2006
                                                                                                                                                                                                                                                                                                                                                 2041
                                                                                                                                                                                                                                                                                                                                                                               1946
                                                                                                                                                                                                                                                                                                                                                                                                           1981
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1861
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1801
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1741
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1681
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1597
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1537
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1561
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1501
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1441
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1321
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       NNGTCCTCGCCNNNNGCCANNAGGTCTCGCTCGCNGCCGTCAACGCCTGGAAGGTCGCCT 1920
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               GGCAAGCTCAACTTCACGCAGCTCACCGAGATGCTCAACGCCGGCATGAACCGCGGCCTN
                                                                                                                                                                                                               ACGTCCTCGTCAAGATGCTCGCNTAG 2186
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CTCGAGCCGCGCTGGCACGACGCCTTCTCGTTCGCGACCGGCACCGTCGAGNNNNNN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GTCTCGCTCATCGACCAGCACTTTGGCTCCGCCATGACCGGCTCGAACCTGCGCGACGAG 1716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 CAGGCCGTCGACCTCCGCGCGATGGAGTTCCGAGTTCAAGAAGCAGTTCGACCCGNTNNTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CAGCCGGCNGAGATGGGCAACCAGGCCGTCAACTCGCTCGCNCTCATCTCGGCNCGCCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CONTECTGECTGECGAGGACCENTEGETCTCTATCACTGCAAGGGCCTCGACATT
                                                                                                                                                                                                                                                                                     TGACGATCGGCACCAACGTCTCCCGCATCTACGAGGCCATCAAGNNCGGCNGCATCAACC 2160
                                                                                                                                                                                                                                                                                                                                                                               CGACCTCGTCGCCCGCGCTCTCGTACCTCTCGCCGCGCACTCAGATCCTCTACGCCTTCG
                                                                                                                                                                                                                                                                                                                                                                                                          cercercecececercoceracerececececececececerecreracreerice
                                                                                                                                                                                                                                                                                                                                                                                                                                         CCGCCGAGTCGGCCATCTCGCTCACCCGCCAAGTCCGCGAGACCTTCTGGTCCGCCGCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CCGCCGAGAAGGCCATCTCGCTCACGCGCNANGTCCGCGACNCCTTCTGGNCGGCNCCGT 1980
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             CTCGTCCCGCGCTGGCACGCCTTCTCCTTCGCCGCCGCCACCGTCGTCGAGGTCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CTCGTCGAGAAGGTGAACAAGACGCTCGCCAAGCGCCTCGAGCAAGCCAACTCGTACGAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   CTCGNGGACAAGGTCAACAAGNCGCTCNACAAGCGNCTCGAGCAGACCAACTCGTACGAC 1800
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CAGCCGGCTGAGATGGCGAACCAGGCGGTCAACTCGCTTGCGCTCATCTCGGCTCGTCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             GCCGCTGCGGCGTACACCTCGGAGTTGGGACACCTCGCCAACCCTGTGACGACGCATGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       gccgcngcngcnracactroggagcroggncacctrgccaacccggrnacgacccacgro
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      CCCTCCTGCCTCGCGGCCGAAGACCCCCTCGCTACCACTGCAAGGGCCTCGACATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                GGCAAGCTCAACTTCACGCAGCTCACCGAGATGCTCAACGCCGGCATGAACCGCGGCCTC
                                                                                                                                                                                                                                                        TGACGATCGGCTCGAACGTCTCCAAGATCTACGAGGCCATCAAGTCGGGCAGGATCAACA
                                                                                                                                                                                                                                                                                                                    TCCGCGAGGAGCTCGGCGTCAAGGCCCGCCGCGGCGACGTCTTCCTCGGCAAGCAGGAGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             CAAGCCATCGACTTGCGCGCGACCGAGTTCGAGTTCAAGAAGCAGTTCGGCCCAGCCATC
                                                                                                                      DNA;
                                                                                                                      뫈
                                                                                                                                                                                                 2151
                               EP18Km-6
                                                                                                                                                                                                                                                          2125
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1836
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1860
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1776
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1680
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1620
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1536
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1560
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1476
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1500
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1416
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1356
                                                                                                                                                                                                                                                                                                                                                                                                           2040
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1885
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1656
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1596
                                                                                                                                                                                                                                                                                                                    2065
                                                                                                                                                                                                                                                                                                                                                 2100
                                                                                                                                                                                                                                                                                                                                                                               2005
```

Ş

ATGGCCCCCTCCNTCGACTCGATCGCGACCTCGNTCGCCAACGGCNTCNCNAACGGNTNG

Query Match Best Local S Matches 1829

Similarity

65.7%; 83.7%;

Conservative

0

Score 1626.4; DB 6; Pred. No. 2.1e-218; 0; Mismatches 322;

Indels 35;

Gaps

60

Sequence

2151

BP; 382 A; 830 C;

565 G;

374 T; 0 U; 0

```
The invention relates to methods for biological production of paracci pydroxycinnamic acid (PHCA). The invention relates to developing of a new CC biocatalyst for conversion of glucose to PHCA by incorporation of the CC wild type phenylalanine ammonia lyase (PAL; EC 4.3.1.5) from the yeast CR thodotorula glutinis into Escherichia coli underlying the ability of the CC wildtype PAL to convert tyrosine to PHCA. The invention is also directed CC wildtype PAL to convert tyrosine to PHCA. The invention is also directed CC incorporation of the wildtype PAL which possesses enhanced tyrosine commonia lyase (TAL) activity from the yeast Rhodotorula glutinis plus the CC plant cytochrome p-450 and the cytochrome p-450 reductase into E. coli. CC Nucleic acid encoding mutant TAL enzyme is useful for producing PHCA by CC recombinant techniques. The recombinantly produced pHCA may be used as a CC monomer for production of liquid crystal polymers (LCP). LCP may be used as a CC in electronic connectors and telecommunication and aerospace capplications. LCP resistance to sterilising radiation has also enabled these materials to be used in medical devices as well as chemical, and CC food packaging applications. The present sequence is Rhodotorula glutinis CPAL mutant DNA. Note: This sequence is not shown in the specification, CC (AAD33075) in the sequence listing
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    phenylalanine ammonia lyase; PAL; glucose; tyrosine ammonia lyase; cytochrome p-450; cytochrome p-450 reductase; liquid crystal polyme LCP; telecommunication; medical device; aerospace application; enz
                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Novel nucleic acid encoding truncated mutant tyrosine ammonia lyase polypeptide, or mutant TAL polypeptide, useful for producing parahydroxycinnamic acid in recombinant host cell lacking cinnamate
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           WPI; 2002-280635/32.
P-PSDB; AAE20668.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    27-JUL-2000; 2000US-00627216.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 mutation
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     mutation
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         mutation
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Rhodotorula glutinis. Synthetic.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 biocatalyst; mutant; variant; gene; ds.
                                                                                                                                                                                                                                                                                                                                                                                                              Disclosure; Page; 139pp; English
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Gatenby AA,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        23-JAN-2001; 2001WO-US002099
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              WO200210407-A1.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  (DUPO ) DU PONT DE NEMOURS & CO E
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Sariaslani FS,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  /product= "Rhodotorula glutinis PAL mutant"
/BC number= "4.3.1.5"
replace(645, G)
/*tag= b
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  replace(858,
/*tag= d
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            replace(1619, T)
/*tag= e
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     replace(792,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Location/Qualifiers
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     IJ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     A
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Tang X,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ŗ.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              WW,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Vannelli
```

, QQ &G &G &G &G &G &G &G &G &G &G &G &G &G	90 AG	94 4d 4d 4d	da Ada Ada	, 60 A 60 A	Db 09	D	B
961 CCNTTCCTCCACGACGTCACGCCCTCACCCGACCCAGATCGAGGTCGAGGCGACATC 1020	841 GCCGTCTCCGCCTCGATGGCGACCCTCGCTCTGCACGACGACACACATGCTCTCCCTC 900	721 GINCACGINNINCACGAGGGCANNGAGAAGATCATGINCGCCCGCGGAGGCGATCGCGCTC 780	601 AGUITCETCAACGAGGATCACCCCATGGTCCCCCTCGGCGACCATCTCGGCGTCG	81 GGNCGCGGCCTCGAGAACTCGCTTCCGCTCGAGGTCGTCCGCGGGGCCATGACCATCCGC 54	361 ACGACTGGTTTCGGCGGCTCGGCCGACACCCGGACTGAGGATGCNATCTCGCTCCAGAAG 420	41 18 01 77	1 ATGGCACCTCGACTCGACTCGACTCGACTCGTTCGCAAACGGCCTCGCATCGCAAAG 60 61 CACGCCGNNCCGNCNNNGNCGNCNACGGGCGCCACGTCCACNCTCNGNCGGCCGNCGCNG 120 61 CACGCCGNNCCGNCNNNGNCGNCNACGGGCGCCACGTCCACNCTCNGNCGGCCGNCGCNG 120 61 CACGCCTGTCAATGGCGCTCGACCAACCTCGCAGTCGCAG 100 121 GCTCGCTCCTCCCGACCACCCAGNNGACGCAGCTCGACAACCTCGTNGAGNAGATCCTCGCCG 180 61
. B & B & B &	Db Qy Db	Q	2 4 d d d d d d d d d d d d d d d d d d	אס מם אס מם אס מם אס מם אס מם אס מם אס מם אס מם אס מם אס מם אס מם אס מם אס מם אס מם אס מם אס מם אס מם אס מם אס	0 40 40 40 40 40 40 40 40 40 40 40 40 40	\$ B \$ B \$	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
2041 TCGCGAGAGTCGGCGTCAAGGCCCGCGGCGGCGGACGTCTTCCTCGGCAAGCAGGAGC	1886 CCGCCGAGTCGGCCATCTCGCTCACCCGCCAAGTCCGCGAGACCTTCTGGTCCGCCGGGT  1981 CGTCGTCGCCCGCGCTCNCGTACCTCTCGCGCGCACGCGCGCGCTCCTGTACTCGTTCG		1657 1741 1717 1801		1417 1501 1477 1561	1381 CONTROLLE C	1141 1117 1201 1177 1177 1261 1237

276

480 396 420 336 300

217 240 160

```
RESULT 13
AAD26924
Ś
                                            ₽,
                                                                                        Ş
                                                                                                                                                                                                                                     Matches 1829;
                                                                                                                                                                                      Query Match
                                                                                                                                                                                                                                                                       The invention relates to a method for producing para-hydroxycinnamic acid (PHCA). The method comprises converting cinnamate to PHCA by converting glucose to phenylalanine to PHCA through the phenyl ammonia-lyase (PAL) route or by generating a new biocatalyst possessing enhanced tyrosine ammonia-lyase (TAL) activity. The method is useful for the biological production of PHCA which is useful as a monomer for the production of Liquid Crystal Polymers (LCP), where the LCP is used in electronic connectors, telecommunications and aerospace applications. LCP is also useful in medical devices, as well as chemical, and food packing applications due to its resistance to sterilising radiation. The present sequence is a DNA encoding red yeast, Rhodotorula glutinis (Rhodosporidium toruloides) mutant PAL derived by substituting Ile at possition 540 with Thr. Mutant PAL enzyme posseses enhanced TAL activity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Tang
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Producing para-hydroxycinnamic acid for producing liquid crystal polymer, comprises converting cinnamate to PHCA, glucose to PHCA by phenyl ammonia -lyase route, or generating a biocatalyst with tyrosine ammonia-lyase
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               CDS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             06-AUG-1999;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          03-AUG-2000; 2000WO-US021156
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     WO200111071-A2
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          mutation
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Phenylalanine ammonia-lyase; PAL; enzyme; cinnamate; food packing; PHCA; para-hydroxycinnamic acid; tyrosine ammonia-lyase; TAL; medical device; Liquid Crystal Polymer; LCP; electronic connector; telecommunication;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Rhodotorula
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    09-APR-2002
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             AAD26924 standard; DNA;
                                                                                                                                                                                                                                  Sequence 2151 BP; 382 A; 830 C; 565 G; 374 T; 0 U; 0 Other;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Claim 13; Page 67-68; 75pp; English
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               P-PSDB; AAE16390.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        15-FEB-2001
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Synthetic
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Rhodotorula glutinis
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  aerospace
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              (DUPO)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                ×
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      2002-121549/16.
  61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              DU PONT DE NEMOURS &
                                                                                                                                                                  Similarity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Vannelli TM,
CACGCCGNNCCGNCNNGNCGNCNACGGGCGCCACGTCCACNCTCNGNCGGCCGNCGCNG
                                                 ATGGCACCCTCGCTCGACTCGATCTCGCACTCGTTCGCAAACGGCGTCGCATCCGCAAAG
                                                                                           ATGGCCCCCTCCNTCGACTCGATCGCGACCTCGNTCGCCAACGGCNTCNCNAACGGNTNG 60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    application; chemical; red yeast; mutant; ds.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     glutinis mutant phenylalanine
                                                                                                                                            Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  (first entry)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             99US-0147719P
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               /*tag= a
/product= "R.
replace(1619,
/*tag= b
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Location/Qualifiers
1. .2151
                                                                                                                                                             65.7%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Qi WW,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             2151
                                                                                                                                          ..
..
                                                                                                                                       Score 1626.4; DB 6; Pred. No. 2.1e-218; 0; Mismatches 322;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             ₽P
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 С
В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          glutinis mutant PAL T)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Sariaslani
                                                                                                                                                                4; DB 6;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     ammonia-lyase (PAL) DNA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Gatenby
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                enzyme"
                                                                                                                                            Indels
                                                                                                                                                                                   Length 2151;
                                                                                                                                            35;
                                                                                                                                          Gaps
                                                 60
                                                                                                                                            u
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              밁
                           Ş
                                                                         밁
                                                                                                                 Ş
                                                                                                                                                                  맑
                                                                                                                                                                                                       5
                                                                                                                                                                                                                                                             뮍
                                                                                                                                                                                                                                                                                                δ
                                                                                                                                                                                                                                                                                                                                                      밁
                                                                                                                                                                                                                                                                                                                                                                                              Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                    뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        δÃ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            멼
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         뮍
                             1141
                                                                                                                        1081
                                                                                                                                                                                                                 1021
                                                                                                                                                                     997
                                                                                                                                                                                                                                                                937
                                                                                                                                                                                                                                                                                                               961
                                                                                                                                                                                                                                                                                                                                                         877
                                                                                                                                                                                                                                                                                                                                                                                                        901
                                                                                                                                                                                                                                                                                                                                                                                                                                                    817
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                841
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           781
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          697
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    721
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   637
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  661
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              577
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           601
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          517
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   541
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  457
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               481
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           397
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            421
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           337
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    277
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             218
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        161
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   101
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             121 GCTCGCTCCTCCCGACCACCCAGNNGACGCAGCTCGACATCGTNGAGNAGATCCTCGCCG 180
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             757
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               ACCCCACCGNNACGNACGNNNTCGAACTCGACGGGTACACCCTCACCCTCGGNGACGTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             TINGGTCTCGAGCCCGTCGTCCTCGGCCCGAAGGAGGGTCTCGGTCTCGTCAACGGCACG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        GGCGACCTCTCCCCCCTCTCTACATCGCCGCCCATCACCGGTCACCCGGACNNCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           PACITICATION CONCERNATION CONTROL OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      GTCAACTCGCTCACNCGCGGCCACTCGGCNGTCCGCCTCGTCGTCGAGGCGCTCACC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             GCNCTCCTCGAGCACCAGCTCTGCGGTGTNCTCCCNACGTCGNTCGANTCCTTCNGCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     ACGACTGGTTTCGGCCGCCCGACACCCCGGACTGAGGATGCNATCTCGCTCCAGAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                AAGATCGACAANAGNGTCGAGTTCCTCCGNNCNCAGCTCNACAACAGNGTCTACGGNGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               TOTOGGOGGGAGGAAGGGCAGGCOTGTCCGCGTCAAGGACAG-CGACGAGATCCGCTCA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            TCGGCGCCCCNCGCAAGGGCCGCNCNGTCCGCGTCNCAGACAGNCGACGAGATCCGCGCA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CGCCGACCGACTCGA---CGCTCGAACTCGACGGCTACTCGCTCAACCTCGGAGACGTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   GCTCGCACCTGCCCACAACCCAGGTCACGCAGGTCGACATCGTCGAGAAGATGCTCGCCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CAGGCTGT----
GGCCCGCTCGTCAGCGACATGATTCACGCCCACGCNGTCCTCTCGCCTCGAGGCCGGNCAG
                                                                                                                 GACGACGAGGGCATTCTCCGCCAGGACCGCTACCCGCTCCGCACGTCACTCAGTGGCTC
                                                                                                                                                                                                                                                                                         CCNTTCCTCCACGACGTCACGCCCCTCACCCGACCCAGATCGAGGTCGCGCGCAACATC
                                                                                                                                                                                                                                                                                                                                                           TCGCAGTCGCTCACGGCCATGACGGTCGAAGCGATGGTCGGCCACGCCGGCTCGTTCCAC
                                                                                                                                                                                                                                                                                                                                                                                           TCGCAGGCGCTCACGGCTCTNACGGTCGAGGCCATGGTCGGCCACGCCGGCTCGTTCCAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                    GCCGTCTCAGCATCGATGGCCACCCTCGCTCTGCACGACGCACACATGCTCTCGCTCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GTGCACGTCGTCCACGAGGCAAGGAGAAGATCCTGTACGCCCGCGAGGCGATGGCGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      GGCGACCTCTCTCTCTACATTGCAGCGGCCATCAGCGGTCACCCGGACAGCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          GTCAACAGCTTGACCCGCGGCCACTCGGCTGTCCGCCTCGTCGTCCTCGAGGCGCTCACC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GGCCGCGGTCTCGAGAACTCGCTTCCCCTCGAGGTTGTTCGCGGCGCCATGACAATCCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GCTCTCCTCGAGCACCAGCTCTGCGGTGTTCTCCCTTCGTCGTTCGACTCGTTCCGCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           ACGACTGGATTTGGCGGATCCGCAGACACCGGCGCGCGGGGACGCCATCTCGCTCCAGAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      AAGATTGACAAATCGGTCGAGTTCTTGCGCTCGCAACTCTCCATGAGCGTCTACGGCGTC
                                                                                                                                                                                                                 CGCACGCTCCTCGAGGGCAGCNNGTTTGCCGTCCACCACGAGGAGGAGGAGGTCAAGGTCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             TTCAACCTCGAGCCCGTCGTCCTCGGCCCGAAGGAGGGTCTCGGTCTCGTCAACGGCACC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       GINCACGINNINCACGAGGGCANNGAGAAGAICAIGINCGCCCGCGAGGCGAICGCGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              AACTTCCTCAACCACGGCATCACCCCCATCGTCCCCCTCCGCGGCACCATCTCTGCGTCG
                                                                         gaceaceaegearrerececeaegaceecraceerrececaegeaegere
                                                                                                                                                                                                                                                                CCCTTCCTTCACGACGTCACGCGCCCTCACCCGACGCAGATCGAAGTCGCGGGAAACATC
                                                                                                                                                                  CGCAAGCTCCTCGAGGGAAGCCGCTTTGCTGTCCACCATGAGGAGGAGGTCAAGGTCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              ----CAATGGCGCCTCGACCAACCTC----
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       =
=
=
=
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            --GCAGTCGCAG
```

1020

936 960

996

840

780 696

756

636 660 576 600 516 540 456

720

816

900

876

```
δ
                                              유왕
                                                                                          8
                                                                                                                   Š
                                                                                                                                                 D,
                                                                                                                                                                      Ş
                                                                                                                                                                                                 Д
                                                                                                                                                                                                                     δ
                                                                                                                                                                                                                                             ďď
                                                                                                                                                                                                                                                                      Ş
                                                                                                                                                                                                                                                                                                  B
                                                                                                                                                                                                                                                                                                                     S
                                                                                                                                                                                                                                                                                                                                               Дb
                                                                                                                                                                                                                                                                                                                                                                     5
                                                                                                                                                                                                                                                                                                                                                                                              dd
                                                                                                                                                                                                                                                                                                                                                                                                                       δδ
Ω
                                                                                                                                                                                                                                                                                                                                                                                                                                                                     5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  멍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       뭕
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    β
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              B
 2126
                                                                                                                                                  1946
                                                                                                                                                                          1981
                                                                                                  2006
                                                                                                                          2041
                                                                                                                                                                                                   1886
                                                                                                                                                                                                                                                   1837
                                                                                                                                                                                                                                                                             1861
                                                                                                                                                                                                                                                                                                      1777
                                                                                                                                                                                                                                                                                                                             1801
                                                                                                                                                                                                                                                                                                                                                      1717
                                                                         2101
                                                                                                                                                                                                                           1921
                                                                                                                                                                                                                                                                                                                                                                             1741
                                                                                                                                                                                                                                                                                                                                                                                                      1657
                                                                                                                                                                                                                                                                                                                                                                                                                              1681
                                                                                                                                                                                                                                                                                                                                                                                                                                                       1597
                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1621
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1537
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1561
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1477
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1501
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1417
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1441
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1357
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1381
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1297
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1321
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1237
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1261
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1177
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1201
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1117
                                                                                                                                                                                                                                                                 NNGTCCTCGCCNNNNGCCANNAGGTCTCGCTCGCNGCCGTCAACGCCTGGAAGGTCGCCT 1920
                                                                 TGACGATCGGCACCAACGTCTCCCGCATCTACGAGGCCATCAAGNNCGGCNGCATCAACC
                                                                                                               TCCGCGAGGAGCTCGGCGTCAAGGCCCGCCGCCGCCGACGTCTTCCTCGGCAAGCAGGAGG
                                                                                                                                                                      CGTCGTCGCCCCGCGCTCNCGTACCTCTCGCCGCGCACGCGCGCGCTCCTGTACTCGTTCG
 ACGTCCTCAAGATGCTCGCTTAG
              ACGTCCTCGTCAAGATGCTCGCNTAG
                                                                                                   TCCGCGAGGAGC
                                                                                                                                                 CGACCTCGTCGCCCGCGCTCTCGTACCTCTCGCCGCGCACTCAGATCCTCTACGCCTTCG
                                                                                                                                                                                                  CCGCCGAGTCGGCCATCTCGCTCACCCGCCAAGTCCGCGAGACCTTCTGGTCCGCCGCGT
                                                                                                                                                                                                                      CCGCCGAGAAGGCCATCTCGCTCACGCGCGANAGTCCGCGACNCCTTCTGGNCGGCNCCGT
                                                                                                                                                                                                                                                     TCGTCGACGTC
                                                                                                                                                                                                                                                                                                                     CTCGAGCCGCGCTGGCACGACGCCTTCTCGTTCGCGACCGGCACCGGTCGAGNNNNNN 1860
                                                                                                                                                                                                                                                                                                                                                                   CTCGNGGACAAGGTCAACAAGNCGCTCNACAAGCGNCTCGAGCAGACCAACTCGTACGAC
                                                                                                                                                                                                                                                                                                                                                                                                     GTCTCGCTCATCGACCAGCACTTTGGCTCCGCCATGACCGGCTCGAACCTGCGCGCGACGAG 1716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               GGCAAGCTCAACTTCACGCAGCTCACCGAGATGCTCAACGCCGGCATGAACCGGGGCCTN 1380
                                               TGACGATCGGCTCGAACGTCTCCAAGATCTACGAGGCCATCAAGTCGGGCAGGATCAACA
                                                                                                                                                                                                                                                                                                   CTCGTCCCGCGCTGGCACGACGCCTTCTCCTTCGCCGCCGGCACCGTCGTCGAGGTCCTC 1836
                                                                                                                                                                                                                                                                                                                                                     CTCGTCGAGAAGACGAAGACGCTCGCCAAGCGCCTCGAGCAGACCAACTCGTACGAC
                                                                                                                                                                                                                                                                                                                                                                                                                             CAAGCCATCGACTTGCGCGCGACCGAGTTCGAGTTCAAGAAGCAGTTCGGCCCAGCCATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                             CAGGCCGTCGACCTCCGCGCGATGGAGTTCGAGTTCAAGAAGCAGTTCGACCCGNTNNTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CAGCCGGCTGAGATGGCGAACCAGGCGGTCAACTCGCTTGCGCTCATCTCGGCTCGTCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CAGCCGGCNGAGATGGGCAACCAGGCCGTCAACTCGCTCGCNCTCATCTCGGGCNCGCCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          GCCGCTGCGGCGTACACCTCGGAGTTGGGACACCTCGCCAACCCTGTGACGACGCATGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 gccgcngcngcntacacttcggagctcggncaccttgccaacccggtnacgacccacgtc
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CCCTCCTCCCCCCGCGAAGACCCCTCGCTCTCCTACCACTGCAAGGGCCTCGACATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 CONTCCTGCCTCGCTGCCGAGGACCCNTCGCTCTCCTATCACTGCAAGGGCCTCGACATT 1440
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               TCGACGACCACCACCTCTCATCGACGTCGAGACAAGACTTCGCACCACGGCGGCAAT 1236
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                TCGACGACCACCACCACCGCTCATCGACGTCGAGAACAAGANGACCCACCACCACGGCGGCAAC 1260
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          GGCAAGCTCAACTTCACGCAGCTCACCGAGATGCTCAACGCCGGCATGAACCGCGGCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            TTCCAGGCTGCCGCTGTGGCCAACACCATGGAGAAGACTCGCCTCGGGCTCGCCCAGATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            2151
                       2186
                                                                       2160
                                                                                                                                                 2005
                                                                                                                                                                                                                          1980
                                                                                                                                                                                                                                                   1885
                                               2125
                                                                                                                       2100
                                                                                                                                                                          2040
                                                                                                                                                                                                  1945
                                                                                                                                                                                                                                                                                                                                                     1776
                                                                                                 2065
                                                                                                                                                                                                                                                                                                                                                                           1800
                                                                                                                                                                                                                                                                                                                                                                                                                                                      1656
                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1680
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1596
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1620
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1536
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1560
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1476
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1500
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1416
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1356
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1296
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1320
```

```
ds; gene; phenylalanine ammonia-lyase; PAL; phenylalanine hydroxylase; PAH; para-hydroxycinnamic acid; tyrosine ammonium lyase; TAL; PAL/TAL; tyrosine; cinnamic acid; PHCA; liquid crystal polymer.
                                                                                                                                                                                        (DUPO)
                                                                                                                                                                                                    04-MAY-2001; 2001US-0288701P
                                                                                                                                                                                                                03-MAY-2002; 2002WO-US018551.
                                                                                                                                                                                                                                                                                   Rhodtorula glutinis.
                                                                                                                                                                                                                                                                                                                        R. glutinis
                                                                                                                                                                                                                                                                                                                                    27-JAN-2003
                                                                                                                                                                                                                                                                                                                                                            ABS56543 standard;
                                                                                                                                                                                                                                        WO200290523-A2
                                                                                                                                                              2003-058928/05
                                                                                                                                                                                       DU PONT DE NEMOURS & CO
                                                                                                                                                                                                                                                                                                                       DNA encoding PAL/TAL naturally occurring variant
                                                                                                                                                                                                                                                                                                                                    (first
                                                                                                                                                                                                                                                                Location/Qualifiers
1. .2151
                                                                                                                                                                                                                                                    /*tag= a
/product= "PAL/TAL
                                                                                                                                                                                                                                                                                                                                                            DNA;
                                                                                                                                                                          Tang
                                                                                                                                                                                                                                                                                                                                                            2151
                                                                                                                                                                          ×
                                                                                                                                                                                        Ħ
```

Novel recombinant host for producing para-hydroxycinnamic acid and tyrosine, comprises gene encoding tyrosine ammonium lyase activity gene encoding phenylalanine hydroxylase activity. and

Example 4; Page 66-67; 69pp; English.

The invention relates to a recombinant host comprising at least one gene concoding a thempylalanine hydroxylase (PAH) activity, and at least one gene concoding a phenylalanine hydroxylase (PAH) activity. Also included are:

(C) (1) a method for producing para-hydroxycinnamic acid involving: (1) providing the recombinant host; and (2) growing the recombinant organism in the presence of a fermentable carbon substrate and thus producing para-hydroxycinnamic acid; (2) method for producing tyrosine involving: (1) providing a recombinant organism comprising at least one gene encoding a comproducing para-hydroxycinnamic acid and tyrosine in the presence of a fermentable carbon substrate to produce tyrosine. The recombinant host cell is used for producing para-hydroxycinnamic acid and tyrosine. Increasing the carbon flow into the production of para-hydroxycinnamic acid (PHCA) which is useful as a componer for the production of liquid crystal polymer. The present sequence encodes a naturally occurring variant of the R. glutinis Phenylalanine ammonia-lyase, PAL, which has TAL activity (PAL/TAL)

Sequence 2151 BP; 382 A; 830 C; 565 G; 374 T; 0 U; 0 Other;

65.7%; 83.7%;

Length 2151;

```
Š
                                                                                                   9
               Ş
                                            밁
                                                                                                                            8
                                                                                                                                                           Query Match
Best Local Similarity
Matches 1829; Conserv
                121
                                            61
                                                                      61
                                                                                                     -
                                                                                                                                 در
GCTCGCTCCTCCCGACCACCCAGNNGACGCAGCTCGACATCGTNGAGNAGATCCTCGCCG
                                            CAGGCTGT--
                                                                      CACGCCGNNCCGNCNNNGNCGNCNACGGGGGGCGACGTCCACNCTCNGNCGGCCGNCGCNG
                                                                                                     ATGGCACCCTCGCTCGACTCGATCTCGCACTCGTTCGCAAACGGCGTCGCATCCGCAAAG
                                                                                                                               ATGGCCCCTCCNTCGACTCGATCGCGACCTCGNTCGCCAACGGCNTCNCNAACGGNTNG
                                                                                                                                                              Conservative
                                                                                                                                                           Score 1626.4; DB 7; Pred. No. 2.1e-218; 0; Mismatches 322;
                                            ---CAATGGCGCCTCGACCAACCTC----GCAGTCGCAG
                                                                                                                                                            35;
                  180
                                            100
                                                                        120
                                                                                                     60
                                                                                                                                 60
                                                                                                                                                            5
```

RESULT 14 ABS56543

```
1117
                                                                                                                                                                                                                           1141
                                                                                                                                                                                                                                                                                                                        1057
                                                                                                                                                                                                                                                                                                                                                                                                               1081
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1021
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 421
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        337
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            277
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 218
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              101
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       997
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            937
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   961
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                877
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        901
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    817
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            841
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         757
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 781
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             697
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     721
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  637
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         661
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      577
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              601
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           517
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  541
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               457
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            481
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        397
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          161
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 GCNCTCCTCGAGCAGCTGTGCGGGTGTNCTCCCNACGTCGANTCCTTCNGCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         ACGACTGGTTTCGGCGGCTCGGCCGACACCCCGGACTGAGGATGCNATCTCGCTCCAGAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CGCCGACCCGACTCGA----CGCTCGAACTCGAACGCTCGAACCTCGGAGACGTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         ACCCCACCGNNACGNACGNNNTCGAACTCGACGGGTACACCCTCACCCTCGGNGACGTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GCGTCTCCGCCTCGATGGCGACCCTCGCTCTGCACGACGACACACATGCTCTCGCTCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           GINCACGINNINCACGAGGGCANNGAGAAGAICAIGINCGCCCGCGAGGCGAICGCGCIC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GGCGACCTCTCCCCNCTCTCNTACATCGCCGCCGCCATCACCGGTCACCCGGACNNCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       AACTTCCTCAACCACGGCATCACCCCCATCGTCCCCCTCCGGGGACCATCTCGGGGTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                GTCAACTCGCTCACNCGCGGCCACTCGGCNGTCCGCCTCGTCGTCGTCGAGGCGCTCACC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    GGCCGCGGTCTCGAGAACTCGCTTCCCCTCGAGGTTGTTCGCGGCGCCATGACAATCCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         ACGACTGGATTTGGCGGATCCGCAGACACCCGCACCGAGGACGCCATCTCGCTCCAGAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 retregecegegaaggaaggecetetecegeteaaggacag-egacgagatecegetea
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                GCTCGCACCTGCCCACAACCCAGGTCACGCAGGTCGACATCGTCGAGAAGATGCTCGCCG
TCGACGACCGACAACCCGCTCATCGACGTCGAGAACAAGANGACCCACCACGGCGGCAAC 1260
                                                                                                                              GGCCCGCTCGTCAGCGACATGATTCACGCCCACGCNGTCCTCTCGCCTCGAGGCCGGNCAG
                                                                                                                                                                                                                                                                                                                        GACGACGAGGGCATTCTCCGCCAGGACCGCTACCCCTTGCGCACGTCTCCTCAGTGGCTC
                                                                                                                                                                                                                                                                                                                                                                                       GACGACGAGGGCATTCTCCGCCAGGACCGCTACCCGCTCCGCACGTCGCCTCAGTGGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CGCACGCTCCTCGAGGGCAGCNNGTTTGCCGTCCACCACGAGGAGGAGGTCAAGGTCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CCCTTCCTTCACGACGTCACGCGCCCTCACCCGACGCAGATCGAAGTCGCGGGAAACATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       TCGCAGTCGCTCACGGCCATGACGGTCGAAGCGATGGTCGGCCACGCCGGCTCGTTCCAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      eccencrica de arte de carecte de retre cacea cacaca cacaca recrete con esta en contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra de la contra del la contra del la contra del la contra del la contra del la contra de la contra de la contra de la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la co
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         TTCAACCTCGAGCCCGTCGTCCTCGGCCCGAAGGAGGGTCTCGGTCTCAACGGCACC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        TINGGICICGAGCCCGICGICCTCGGCCCGAAGGAGGGICTCGGICICGTCAACGGCACG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GTGCACGTCGACGAGGGCAAGGAGAAGATCCTGTACGCCGAGGCGATGGCGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             ĠĠĊĠĂĊĊŢĊŢĊŢĊŢĊŢĊŢĊĊŢĀĊĀŢŢĠĊĄĠĊĠĀŢĊĀĠĊĠĠŢĊĀĊĊĊĠĠĀĊĄĠĊĀĀĠ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           AACTTCCTCAACCACGGCATCACCCCCATCGTCCCCCTCCGCGGCACCATCTCTGCGTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               GTCAACAGCTTGACCCGCGGCCACTCGGCTGTCCGCCTCGTCGTCGAGGCGCTCACC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        dererectedadeaceadererecedre reference recenteda en contente en contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de contente de co
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 AAGATTGACAAATCGGTCGAGTTCTTGCGCTCGCAACTCTCCATGAGCGTCTACGGCGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    AAGATCGACAANAGNGTCGAGTTCCTCCGNNCNCAGCTCNACAACAGNGTCTACGGNGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 CGCAAGCTCCTCGAGGGAAGCCGCTTTGCTGTCCACCATGAGGAGGAGGTCAAGGTCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              160
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    516
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  456
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      276
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          217
                                                                                                                                                                                                                                                                                                                            1116
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1056
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  396
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 336
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  240
                                                                                                                                                                                                                                     1200
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1080
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     996
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     936
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  960
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         876
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 900
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              816
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          840
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  756
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               780
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       696
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           636
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        660
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               576
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            600
```

뮍 δ 뮍 8 멂 Ś В Ş 밁 Ś 멁 Š ğ δ В Ş 멁 Ş В Ś В Ś 밁

ð

밁

P. P.

유정

성 유 성

밁

1177

TCGACGACCGACAACCCTCTCATCGACGTCGAGAACAAGACTTCGCACCACGGCGGCAAT

B & B &

```
Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    멍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    g
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             δÃ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              р
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           멂
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     망
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          5
                                                                                 β Q
                                                                                                                                                               멍
                                                                                                                                                                                                      Š
                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                         Ş
                                                                                                                                                                                                                                                                                                                                      Ď,
                                                                                                                                                                                                                                                                                                                                                                     δ
                                                                                                                                                                                                                                                                                                                                                                                                                  뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                             8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             В
멅
                        8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1477
                                                                                 2066
                                                                                                                                                                                                                                                       1946
                                                                                                                                                                                                                                                                                                1981
                                                                                                                                                                                                                                                                                                                                          1886
                                                                                                                                                                                                                                                                                                                                                                                                                           1837
                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1861
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1777
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1801
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1717
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1741
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1657
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1681
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1597
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1621
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1537
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1561
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1501
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1417
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1441
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1357
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1381
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1297
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1321
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1237
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1261
2126
                                                                                                                       2101
                                                                                                                                                                  2006
                                                                                                                                                                                                            2041
                                                                                                                                                                                                                                                                                                                                                                                   1921
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          GCCGCNGCNTACACTTCGGAGCTCGGNCACCTTGCCAACCCGGTNACGACCCACGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    GGCAAGGTCAACTTCACGCAGCTCACCGAGATGGTCAACGCCGGCATGAACCGCGGGCTN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   CAGGCCGTCGACCTCCGCGCGATGGAGTTCGAGTTCAAGAAGCAGTTCGACCCGNTNNTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              ACGACCGAGTCCAACGACGTCCTTTCTCTCCTCCTCGCCACCACCTCTACTGCGTTCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CAGCCGGCNGAGATGGGCAACCAGGCCGTCAACTCGCTCGCCCTCATCTCGGCNCGCCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                GCCGCTGCGGCGTACACCTCGGAGTTGGGACACCTCGCCAACCCTGTGACGACGCATGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GGCAAGCTCAACTTCACGCAGCTCACCGAGATGCTCAACGCCGGCATGAACCGCGGCCTC
                                                                                                                                                                  NNGTCCTCGCCNNNNGCCANNAGGTCTCGCTCGCNGCCGTCAACGCCTGGAAGGTCGCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CTCGAGCCGCGCTGGCACGCCTTCTCGTTCGCGACCGGCACCGTCGTCGAGNNNNNN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             CTCGNGGACAAGGTCAACAAGNCGCTCNACAAGCGNCTCGAGCAGACCAACTCGTACGAC 1800
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       checceecreachieceahceaeceerchacicecricecricarereecic
                           ACGTCCTCGTCAAGATGCTCGCNTAG
                                                                                                              TGACGATCGGCACCAACGTCTCCCGCATCTACGAGGCCATCAAGNNCGGCNGCATCAACC
                                                                                                                                                                                                                                                     CGACCTCGTCGCCCGGCTCTCGTACCTCTCGCCGCGCACTCAGATCCTCTACGCCTTCG
                                                                                                                                                                                                                                                                           TCGTCGACGTC-----
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               creereceecide cacacacerrerectre concecede cacerreres asserted as a concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern concern con
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CTCGTCGAGAAGGTGAACAAGACGCTCGCCAAGCGCCTCGAGCAACCCAACTCGTACGAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CAAGCCATCGACTTGCGCGCGACCGAGTTCGAGTTCAAGAAGCAGTTCGGCCCAGCCATC
  ACGICCICALGAIGCICGCITAG
                                                                                   TGACGATCGGCTCGAACGTCTCCAAGATCTACGAGGCCATCAAGTCGGGCAGGATCAACA
                                                                                                                                                                                                                                                                                                                                          ccecceaerceecearcreecreacceeceaaerceeceaeaccrrereereececere
                                                                                                                                                                                                                                                                                                                                                                                                                                - GCTCTCGCTCGCCGCCGTCAACGCCTGGAAGGTCGCCG
  2151
                                          2186
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1776
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1620
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1560
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1476
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1500
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1416
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1440
                                                                                                                                                                                                                                                                                                                                                                                                                                1885
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1836
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1680
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1536
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1296
                                                                                                                                                                                                                                                                                                                                                                                       1980
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1596
                                                                                          2125
                                                                                                                                2160
                                                                                                                                                                        2065
                                                                                                                                                                                                                   2100
                                                                                                                                                                                                                                                              2005
```

RESULT 15
ADE36055
ID ADE36055 standard; DNA; 2151 BP.
XX
AC ADE36055;
XX
DT 29-JAN-2004 (first entry)

396

276 360

540

```
뮍
                                                                                                                                       밁
                       Ş
                                                                                            Ş
                                                                                                                                                                  Ş
                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                             5
                                                                                                                                                                                                                                                                                                                                                                                      The present invention describes a method for the recombination of nucleic CC acid (NA) templates. The method comprises: (a) providing at least two CC double-stranded templates (T1, T2) having different 5' and 3' regions in CC their sense strands; (b) contacting the templates with at least one each CC of forward and reverse primers that anneal, respectively, only to the 3'-CC region of the antisense strand of T1 and to the 3'-region of the sense CC (nt); (d) extending the primers by no more than 1000 nucleotides (c) the contacting the primers by no more than 1000 nucleotides (c) reannealing the extended primers, to either template; (a) repeating CC cycles of steps (b)-(e) until at least one full-length extension product, (c) i.e. a recombination of T1 and T2, is obtained. Also described: (1) a method starting from at least one sach of antisense and sense single-CC stranded templates; (2) generating a recombination products of the new CC processes and screening the polypeptides formed for properties different CC altered properties by expressing recombination products of the new CC processes and screening the polypeptides formed for properties different CC in those of polypeptides from either of the templates; and (3) (1) contacted by method (2). The methods are useful for the recombined CC polypeptide having altered properties. The method can be used to make CC combined genes that express proteins e.g. enzymes, cytokines, growth CC combined genes that express proteins e.g. enzymes, cytokines, growth CC combined genes that express proteins e.g. enzymes, cytokines growth CC combined genes that express proteins e.g. enzymes, cytokines growth CC combined genes that express proteins e.g. enzymes, cytokines growth CC combined genes that express proteins e.g. enzymes, cytokines growth CC combined genes that express proteins e.g. enzymes, cytokines growth CC combined genes that express proteins e.g. enzymes, cytokines growth CC combined genes that express combined genes that express combined genes that express combined g
                                                                                                                                                                                                                                                                                        Matches 1829;
                                                                                                                                                                                                                                                                                                        Query Match
Best Local
                                                                                                                                                                                                                                                                                                                                                             Sequence
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Example 2;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Recombination of nucleic acid templates, useful e.g.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Milano
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   WPI; 2003-721766/68
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             26-FEB-2002; 2002US-0360279P
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                26-FEB-2003; 2003WO-US005708
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           WO2003072743-A2
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Rhodosporidium
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 recombination; nuc
altered property;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Rhodosporidium glutinis
                         181
                                                              101
                                                                                                  121
                                                                                                                                       61
                                                                                                                                                                          61
                                                                                                                                                                                                                                                                                                      Similarity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           В
                                                                                GCTCGCTCCTCCCGACCACCCAGNNGACGCAGCTCGACATCGTNGAGNAGATCCTCGCCG
ACCCCACCGNNACGNACGNNUTCGAACTCGACGGGTACACCCTCACCCTCGGNGACGTCG
                                                                                                                                                                      CACGCCGNNCCGNCNNNGNCGNCNACGCGCCCACGTCCACNCTCNGNCGGCCGNCGCNG 120
                                                                                                                                                                                                                                                                                                                                                               2151
                                                                                                                                         CAGGCTGT
                                                                                                                                                                                                                                     ATGGCCCCTCCNTCGACTCGATCGCGACCTCGNTCGCCAACGGCNTCNCNAACGGNTNG
                                                                                                                                                                                                           ATGGCACCCTCGACTCGATCTCGCACTCGTTCGCAAACGGCGTCGCATCCGCAAAG 60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Tang
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   SEQ ID
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           PONT DE
                                                                                                                                                                                                                                                                                                                                                             BP; 382 A; 830 C;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           nucleic acid template; recombined polypeptide ty; combined gene; gene; ds.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 NO 3; 481pp; English.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           NEMOURS & CO
                                                                                                                                                                                                                                                                                                      65.7%;
83.7%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                EP18Km-6 mutant PAL encoding DNA SEQ ID
                                                                                                                                                                                                                                                                                    Score 1626.4;
Pred. No. 2.1e.
0; Mismatches
                                                                                                                                                                                                                                                                                    0
                                                                                                                                     ----CAATGGCGCCTCGACCAACCTC-----GCAGTCGCAG
                                                                                                                                                                                                                                                                                                                                                           565 G; 374 T; 0 U;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ħ
                                                                                                                                                                                                                                                                                    2.1e-218;
nes 322;
                                                                                                                                                                                                                                                                                                                       DB 9;
                                                                                                                                                                                                                                                                                    Indels
                                                                                                                                                                                                                                                                                                                   Length 2151;
                                                                                                                                                                                                                                                                                                                                                             0
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      . for producing
extension of unpaired
                                                                                                                                                                                                                                                                                  35;
                       240
                               S
                                                                          В
                                                                                                           Š
                                                                                                                                                 밁
                                                                                                                                                                                  Ś
                                                                                                                                                                                                                           В
                                                                                                                                                                                                                                                         Ś
                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                               Ş
                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                      Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  B
                                                                                                                                                                                      1141
                                                                                                                                                   1117
                                                                                                                                                                                                                           1057
                                       1261
                                                                                                                                                                                                                                                              1081
                                                                                                                                                                                                                                                                                                                                       1021
                                                                                                               1201
                                                                                                                                                                                                                                                                                                  997
                                                                                                                                                                                                                                                                                                                                                                            937
                                                                                                                                                                                                                                                                                                                                                                                                              961
                                                                                                                                                                                                                                                                                                                                                                                                                                                     877
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        901
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            817
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 841
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    757
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             697
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     637
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           661
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                577
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       781
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                721
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 109
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      517
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          541
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             457
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  481
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        397
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         421
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            337
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     277
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      161
                                                                                                                                                                                                                                                                                                                         CGCACGCTCCTCGAGGGCAGCNNGTTTGCCGTCCACCACGAGGAGGAGGAGGTCAAGGTCAAG
   TTCCAGGCTGCCGCTGTGGCCAACACCATGGAGAAGACTCGCCTCGGGCTCGCCCAGATC
                                     TCGACGACGACAACCCGCTCATCGACGTCGAGAACAAGANGACCCACCACCACGGCGCAAC
                                                                                                                                                                                    gecceerregreaeceaearearreaegeceaecenerecreecreeaegeceeneae
                                                                                                                                                                                                                                                              GACGACGAGGGCATTCTCCGCCAGGACCGCTACCCGCTCCGCACGTCGCCTCAGTGGCTC
                                                                                                                                                                                                                                                                                                                                                                                              TINGGICTCGAGCCCGTCGTCCTCGGCCCGAAGGAGGGTCTCGGTCTCGTCAACGGCACG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      GTNCACGTNNINCACGAGGGCANNGAGAAGATCATGTNCGCCCGCGAGGCGATCGCGCTC
                                                                          TCGACGACCACCACCCTCTCATCGACGTCGAGAACAAGACTTCGCACCACGGCGGCAAT
                                                                                                                                                                                                                                                                                                  CGCAAGCTCCTCGAGGGAAGCCGCTTTGCTGTCCACCATGAGGAGGAGGTCAAGGTCAAG
                                                                                                                                                                                                                                                                                                                                                                        CCCTTCCTTCACGACGTCACGCGCCCCTCACCCGACGCAGATCGAAGTCGCAGGAAACATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                   TCGCAGTCGCTCACGGCCATGACGGTCGAAGCGATGGTCGGCCACGCCCGGCTCGTTCCAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                              TCGCAGGCGCTCACGGCTCTNACGGTCGAGGCCATGGTCGGCCACGCCGGCTCGTTCCAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             GTGCACGTCGTCCACGAGGGCAAGGAGAAGATCCTGTACGCCCGCGAGGCGATGGCGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             GGCGACCTCTCCCCNCTCTCNTACATCGCCGCCGCCATCACCGGGTCACCCGGACNNCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            GTCAACTCGCTCACNCGCGGCCACTCGGCNGTCCGCCTCGTCGTCCTCGAGGCGCTCACC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               GENETECTEGAGEACEAGETETGEGGTGTNCTCCCNACGTEGNTCGANTCCTTCNGCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   TCGGCGCCGCNCGCAAGGGCCCGCNCNGTCCCGCGTCNCAGACAGNCGACAGACCAAGATCCGCGCA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  TTCAACCTCGAGCCCGTCGTCCTCGGCCCGAAGGAGGGTCTCGGTCTCGTCAACGGCACC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   GECGACCTCTCTCTCTCCTACATTGCAGCGGCCATCAGCGGTCACCCGGACAGCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              AACTTCCTCAACCACGGCATCACCCCCATCGTCCCCCTCCGCGGCACCATCTCTGCGTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               AACTTCCTCAACCACGGCATCACCCCCATCGTCCCCCTCCGCGGCACCATCTCGGCGTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             GGCCGCGGTCTCGAGAACTCGCTTCCCCTCGAGGTTGTTCGCGGCGCCATGACAATCCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                GENCGCGGCCTCGAGAACTCGCTTCCGCTCGAGGTCGTCCGCGGCGCCATGACCATCCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      GCTCTCCTCGAGCACCAGCTCTGCGGTGTTCTCCCTTCGTCGTTCGACTCGTTCCGCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                ACGACTGGTTTCGGCGGCCTCGGCCGACACCCCGGACTGAGGATGCNATCTCGCTCCAGAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    AAGATCGACAANAGNGTCGAGTTCCTCCGNNCNCAGCTCNACAACAGNGTCTACGGNGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     AAGATTGACAAATCGGTCGAGTTCTTGCGCTCGCAACTCTCCATGAGCGTCTACGGCGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           TCTCGGCCGAGGAAGGCCAGGCCTGTCCGCGTCAAGGACAG-CGACGAGATCCGCTCA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CGCCGACCGACTCGA----CGCTCGAACTCGACGGCTACTCGCTCAACCTCGGAGACGTCG
```

1236

1200

1080 1056 1140 1020

CCTCCTCAAGATGCTCGCTTA	g Q
cercercaagarecrees	Ş
GATCGGCTCGAACGTCTCCAAGATCTACGAGGCCATCAAGTCGGGCAGGATCAA	В
GGATCGGCACCAACGTCTCCCGCATCTACGAGGCCATCAAGNNCGGCNGCATCA	δ
ccacaadaactradecarcaadacccaccacaadacarcriccradaaaacaaa	ď
CGAGGAGCTCGGCGTCAAGGCCCGCCGCGGCGACGTCTTCCTCCGCAAGCAGGAGG 21	γQ
cercercecegegereregracereregegegegegegegegereerakegeerr	Дb
1 GETCGTCGTCGCGCGCGCTCNCGTACCTCTCGCCGCGCGCGCGCGCGCGTCCTGTACTCGTTC	Qγ
cgccgagreggecareregereaceegecaagreegegagacerrerggreege	ф
GAAGGCCATCTCGCTCACGCGCNANGTCCGCGACNCCTTCTGGNCGGCNCCGT 198	ρ
TCGCCGCCGTCAACGCCTGGAAGGTCC	DЪ
TCCTCGCCNI	Qy
ACGCCTTCTCCTTCGCCGCCGGCACCG	Dβ
CCCCCTGCCACGACGCCTTCTCGTTCGCGACCGGCACCGTCGTCC	Qy
NGAAGGTGAACAAGACGCTCGCCAAGCGCCTCGAGCAGACCAACTCGTAC	Дb
GNGGACAAGGTCAACAAGNCGCTCI	Qy
ATGACCGGCTCGAACCTGCGCGAC	Дb
SCTCNTCNAGCAGCACTTTGGCNCNGCCCTCGACGGCNNNNNNNNNN	γŞ
TCGGC	DЬ
GCCGTCGACCTCCGCCGATGGAGTTCGAGTTCAAGAAGCAGTTCGACCGNTNNTC 16	γQ
1537 ACGACGAGTCCAACGACGTCCTTTCTCTCCTCGCCACCCCACCTCTACTGCGTTCTC 1596	DЬ
CNGCCGAGGCCAACGACGTCCTTTCTCTCCTCCT	γQ
TOGIC	Фd
AGCCGGCNGAGATGGGCAACCAGGCCGTCAACTCGCTCGCNCTCATCTCGGCNCGCCG	Ϋ́
CCGCTGCGGCGTACACCTCGGAGTTGGGACACCTCGCCAACCCTGTGACGACGCATGT	В
1441 GCCGCNGCNTACACTTCGGAGCTCGGNCACCTTGCCAACCCGGTNACGACCCACGTC 1500	Qy
1357 CCCTCCTGCCTCGCGAAGACCCCTCGCTCCTACCACTGCAAGGGCCTCGACATC 1416	Db
CNTCCTGCCTGCCGAGGACCCNTCGCTCTCTATCACTGCAAGGGCCTCC	γQ
GGCATGAACCGCGG	DЪ
1321 GGCAAGCTCAACTTCACGCAGCTCACCGAGATGCTCAACGCCGGCATGAACCGCGGCCTN 1380	γQ

Search completed: September 11, 2004, 14:50:34 Job time : 1376.94 secs

• 

```
Result
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Post-processing: Minimum Match 0%
Maximum Match 100%
Listing first 45 summaries
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Minimum DB
Maximum DB
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Database
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Scoring table:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Title:
Perfect score:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           OM nucleic -
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Searched:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Sequence:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Total number of hits satisfying chosen parameters:
                                          a
                                                                                                                                                                            Ω
    Pred. No. is the number of results predicted by chance to have a score greater than or equal to the score of the result being printed, and is derived by analysis of the total score distribution.
                                                                                                                                                                           1699.4
1626.4
1626.4
1623.2
1623.2
1623.2
1610.4
1329.6
1329.6
131.6
131.6
131.6
  107.4
107.4
106.6
106.2
97.2
94.2
94.2
                                                                                                                                                                                                                                                                                                                                                                                Score
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               seq length: 0
seq length: 2000000000
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         nucleic search, using sw model
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     IDENTITY NUC Gapext 1.0
                                                                                                                                                                                                                                                                                                                                                                          Query
Match Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Issued_Patents NA:*
1: /cgn2_6/ptodata/2/ina/5A_COMB.seq:*
2: /cgn2_6/ptodata/2/ina/5B_COMB.seq:*
3: /cgn2_6/ptodata/2/ina/6A_COMB.seq:*
4: /cgn2_6/ptodata/2/ina/6A_COMB.seq:*
5: /cgn2_6/ptodata/2/ina/PCTUS_COMB.seq:*
6: /cgn2_6/ptodata/2/ina/backfiles1.seq:*
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                US-09-939-408A-20
2475
1 atggcccctccntcgactc.....nnnnnnnnnnnnnnnnnnnn 2475
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    September 11, 2004, 13:38:08; Search time 185.6 Seconds (without alignments) 7400.353 Million cell updates/sec
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                682709 seqs, 277475446 residues
    GenCore version 5.1.6 Copyright (c) 1993 - 2004 Compugen Ltd.
                            日
US-09-624-693A-20
US-09-624-693A-18
US-09-624-693A-12
US-09-627-216A-9
US-09-627-216A-9
US-09-765-873A-9
US-09-765-873A-31
US-09-765-873A-31
US-09-624-693A-16
US-09-615-192A-245
US-09-615-192A-245
US-09-615-192A-247
US-09-615-192A-247
US-09-615-192A-247
US-09-615-192A-247
US-09-615-192A-247
US-09-615-192A-247
US-09-130-114-2
US-09-130-114-2
US-09-410-551B-1
US-09-410-551B-1
US-09-410-551B-1
US-09-410-551B-1
US-09-775-316-9
US-09-775-316-9
US-09-775-316-9
US-09-775-316-9
US-09-775-316-9
US-09-775-316-9
                                                                                                                                                                                                                                                                                                                                                                                                                        SUMMARIES
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1365418
Sequence 20, Appl

Sequence 12, Appl

Sequence 12, Appli

Sequence 9, Appli

Sequence 7, Appli

Sequence 7, Appli

Sequence 16, Appl

Sequence 16, Appl

Sequence 16, Appl

Sequence 16475, Appl

Sequence 16475, Appl

Sequence 16475, Appl

Sequence 16475, Appl

Sequence 447, Appl

Sequence 45, Appl

Sequence 45, Appl

Sequence 45, Appl

Sequence 45, Appl

Sequence 47, Appl

Sequence 48, Appl

Sequence 49, Appli

Sequence 244, Appli

Sequence 244, Appli

Sequence 244, Appli

Sequence 244, Appli

Sequence 244, Appli

Sequence 244, Appli

Sequence 244, Appli

Sequence 9, Appli

Sequence 9, Appli

Sequence 9, Appli

Sequence 9, Appli

Sequence 9, Appli

Sequence 9, Appli

Sequence 9, Appli

Sequence 9, Appli

Sequence 9, Appli

Sequence 9, Appli

Sequence 9, Appli
                                                                                                                                                                                                                                                                                                                                                                               Description
```

								•				
Q	D	D 09	ρ δ	p 09	Mac Mac Due	US-0			., ., ., ., ., ., ., ., ., ., ., ., ., .	RESULT US-09-0 ; Sequents; Patents		
					CP T	NAME/KEY: LOCATION: OTHER INFO OTHER INFO OTHER INFO OTHER INFO OTHER INFO atent No. 6 09-624-693/	LENGTH: 2 TYPE: DNA ORGANISM:	CURRENT CURRENT CUMBER SOFTWAL	ATTE SI LILLE C LILLE C LILLE C LILLE C VAPITICA	JLT 1 )9-624: equence atent 1		0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
241 TC	181 ACC	121 GC 121 GC	61 CA 61 CA	1 AT	Match ocal Simi s 2408;	/KEY: mi TION: (1) TION: (1) R INFORN R INFORN R INFORN NO. 638 4-693A-2	1: 2475 DNA DNA	PAPPLI OF SEC	ANT: YOUNT: YOU INVIDE INVIDE INVIDE INVIDERATION	-693A-2 - 20, 1		9911
Gececo	CCAC	1090	1000000 111111111111111111111111111111		nilarit Conse	KEY: misc_diff ION: (13, 34, INFORMATION: INFORMATION: INFORMATION: INFORMATION: NO. 6355468	ctifici	CATION OF DATE OF ID NO Centin	contida, Cootsti Coots	WESULT 1  S-09-624-693A-20  Sequence 20, Applicat Patent No. 6355468  GRADERAL TOPORMATION.		777777777777777 
	GNNAC	3=3	CGCCGNNCCGNCNNNGNCGNCNACGGGCGCCACGTCCACNCTCNGNCGGCCGNCGCNG	TGGCCCCCTCCNTCGAC	86. Y 100 rvative	Herence 46, 49, 51, 57 n = A or C or Description of Sequence of SE	.al Seç	NUMBE 1: 200 3: 25 Ver. 2	APPLICANT: Yoshida, Roberta APPLICANT: Kootstra, Anna TITLE OF INVENTION: Phenylalanine i TITLE OF INVENTION: Polynucleotide TITLE OF INVENTION: Using Same FILE REFERENCE: 29479/500NSC	ation U		4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4
:AAGG	GNACG	CCGACCAC	CNNNG!	7495, 11111	. o.	nce of	Sequence	R: U: 0-07	ta la la la la la la la la la la la la la	IS/09		4444444404004
GCCGC	GNNNTC	CCCAG	GNCGNCN	TCGAT	Score; Pred	1, 57 C or on of of SE	w	s/09/ -24	anine A leotide ame	US/09624693A	₽	- SD - SD - SD - SD - SD - SD - SD - SD
NCNGT	GAACI       GAACI	GNNGAC	NACGG 	CGCGA				524,	u 4	3 A	ALIGNMENTS	099-100 099-100 099-100 099-100 099-100 099-100 099-100 099-100
	TCGACG	CGCAGO	00000000000000000000000000000000000000	CCICGN	2128; No. 0; matches	. 59, 68, 69 3 or T; "n" Artificial 7 ID NOS: 12		693A	ч.		ENTS	US-09-615-192A-9 US-09-169-789-9 US-08-456-837-6 US-08-457-342-6 US-08-457-342-6 US-08-457-342-6 US-08-457-33A-4 US-08-764-233A-4 US-08-764-233A-6 US-08-764-233A-6 US-08-764-23A-6 US-08-764-23A-6 US-08-764-23A-6 US-08-764-23A-6 US-08-763-35-98-1 US-09-103-840A-2 US-09-103-840A-2
FICNC	GGTA	CTCGA	ACGTC	NTCG	DB 4;	69, 1 1" inc 11 Sec 12, 1			a se			
AGACA	OO	CCAGNNGACGCAGCTCGACATCGTNGAGNAGATCCTCGCC	CACNO CACNO	CGATCGCGACCTCGNTCGCCAACGGCNTCNCNAACGGNTNG 	~-	9, 73, 75 - indicates Sequence: 2, 16, and			Polypeptide d Methods o			
GNCGA	CACC	TNGAGNA        TNGAGNA	CTCNG	CGGCNT	Length Indels				nods			
CGAGA	CTCGG	NAGAT       NAGAT	CTCNGNCGGC	CNCNAA CNCNAA	2475;	2 7			e and of Obta			sequence sequence
TCCGC	TCGGNGACGT	CCICGC 	CGNCGCNG	ACGGNTNG         ACGGNTNG	; сар	, 79, 82, consensus sensus			taining			
	ନ୍ଦ=କ	വ—വ			s dt	84, at						Appli Appli Appli Appli Appli Appli Appli Appli Appli Appli Appli Appli Appli Appli Appli Appli Appli Appli Appli Appli
300	240 240	180	120· 120	60	0;	that			and			
						position						
						cion						

01 NNNANAAA	מם	1321 GGCAAGCTCAACTTCACGCAGCTCACCGAGATGCTCAACGCCGGCATGAACCGCGGCCTN 1380 	, B 8
1	O D &	1261 TTCCAGGCGNCCGCTGTCGCNAACACGATGGAGAAGACTCGCCTTCGCNCTCGCCCTGATC 1320	40 40
281 TRININGCANNINACTINGCUCINNINANACHIGGUANNIGAUTINNINNINGCUNINGCUNINNINGCUNINGCUNINNINGCUNINGCUNINNINGCUNINGCUNINNINNINNINNINNINNINNINNINNINNINNINNIN	OV DB K	1201 TCGACGACCACCGCTCATCGACGTCGAGAACAAGANGACCCACCACCACGGCGGCAAC 1260 	g 4
2221 NANGCANANAWACIA ILASANA LOSANA LOSANA LAKOKA KARAMA 2200 221 NANGCANANANANCINTINGANANICGANITONGANANINANGGANATINGKANANANAN 2280 2221 NANGCANANANANCINTINGANANICGANITONGANANANGGANATINANANANANAN 2280 2281 TANANANTANANCITANANANANANANANANANANANANANANANANANANAN	מם שם	1141 GGCCCGCTCGTCAGCGACATGATTCACGCCCACGCNGTCCTCTCGCTCGAGGCCGGNCAG 1200	δ 40 δ
161 ACGICCICGICAAGAIGCICGCNIAGANWCKCNANCCAANCICCCNIAMANNCCCNANCAC	Q dd (y	1081 GACGACGAGGGCATTCTCCGCCAGGACCGCTACCCGCACGTCGCCTCAGTGGCTC 1140	δ δ
OI TGACGATCGGCACCAACGTCTCCCGCATCTACGAGGCCATCAGNNCGGCNGCATCAACCC OI TGACGATCGGCACCAACGTCTCCCGCATCTACGAGGCATCAAGNNCGGCNGCATCAACCC OI TGACGATCGGCACCAACGTCTCCCGCATCTACGAGGCCATCAAGNNCGGCNGCATCAACCC	; p &	1021 CGCACGCTCCTCGAGGGCAGCNNGTTTGCCGTCCACCACGAGGAGGAGGTCAAGGTCAAG 1080	Db Qy
41 TCCGCGAGGAGCTCGGCGTCAAGGCCCGCCGGCGAGGTCTTCCTCGGCAAGCAGGAGGT	d d	961 CCNTTCCTCCACGACGTCACGCGCCCTCACCCGACCCAGATCGAGGTCGCGCGCAACATC 1020	A 4d
81 CGTCGTCGCCGCGCTCNCGTACCTCTCGCCGCGCGCGCGCGCGTCCTGTACTCGTTCG	40	901 TCGCAGGCGCTCACGGCTCTNACGGTCGAGGCCATGGTCGGCCACGCCGGCTCGTTCCAC 960	g 99
1921 CCGCCGAGAAAGGCCATCTCGCTCAACGCGCNANGTCCGCGACNCCTTCTGGNCGGCNCCGT	אַס מַס	841 GCCGTCTCCGCCTCGATGGCGACCCTCGCTCTGCACGACGACACATGCTCTCGCTCCTC 900	99 80
Bel NNGICCTCGCCNNNNGCCANNAGGTCTCGCTCGCNGCGTAACGCCTGAAAGGTCGCCT 1	. a &	781 TINGGICTCGAGCCCGTCGTCCTCGGCCCGAAGGACGGTCTCGGTCTAACGGCACG 840	84 85
BOL CICGAGCCGGGCIGGCAGGACGCCTICTCGTTCGCGACCGGCACCGTCGTCGAGNNNNNNNNNNNN	, p &	721 GTNCACGTNNTNCACGAGGGCANNGAGAAGATCATGTNCGCCCGCGAGGCGATCGCGCTC 780	90 VQ
71 CICGNGGACHAGGICHACHANN CGCICNACHAGCNGICGACHAGCHGACHAGCNGIACGAC I CICGNGGACHAGCNGIACGAC I CICGNGGACHAGCNGIACGAC I CICGNGGACHACAGGICHACHAGAGNGICHACHAGAGCGACGACTGGIACAGAC I CICGNGGACHACAGGICHACHAGAGNGICHAGAGCGACGACGACTGGIACAGAGC I CICGNGGACHACAGAC I CICGNGGACHACAGAGAGAGAGAGAGAGAGAGAGAGAGAGAGAGA	א מם	661 GGCGACCTCTCCCCCNCTCTCNTACATCGCCGCCGCCATCACCCGGTCACCCCGGACNNCAAG 720	P
BI NCHWIGE ICH CHAGLAGACHII GECH CHECCCICGACGCHMNINNNNNNNNNNNNNNNNNACGAA 1 NCHWIGETCHTCHAGCACACTITGGCHCHGCCCTTCGACGCCHMNINNNNNNNNNNNNNNACGAA 1 NCHWIGETCHTCHAGCACACTITGGCHCHGCCCTTCGACGGCNNNNNNNNNNNNNNNNNNACGAA 1	۶۵ م	601 AACTTCCTCAACCACGGCATCACCCCCATCGTCCCCCCCC	40 40
CAGGCCGTCGACCTCCGCCGATGGAGTTCGACTTCAAGAACAGTTCGACCCGNTNNTC	) B &	541 GTCAACTCGCTCACNCGCGGCCACTCGGCNGTCGGCCTCGTCGTCGTCGAGGCGCTCACC 600	40 40
561 ACNGCCGAGGCCAACGACGTCCTTCTCTCCTCCTCGCCACCCAC	א מם	481 GENCGCGGCCTCGAGAACTCGCTTCCGCTCGAGGTCGTCCGCGGCGCCCATGACCATCCGC 540	Qy Db
1. CANCEGE NO CAN CONCERN CONCERN CONTROL OF CONCERN CONTROL OF CONCERN CONCERN CONCERN CONCERN CONCERN CONTROL OF CONCERN CONCERN CONCERN CONCERN CONCERN CONCERN CONCERN CONTROL OF CONCERN CONCERN CONCERN CONCERN CONCERN CONTROL OF CONCERN CONTROL OF CONCERN CONCERN CONTROL OF CONTROL	לא פם ג	421 GCNCTCCTCGAGCACCAGCTCTGCGGTGTNCTCCCNACGTCGNTCGANTCCTTCNGCCTC 480	B 8
1 15 1	0 dd x	361 ACGACTGGTTTCGGCGGCTCGGCCGACACCCCGGACTGAGGATGCNATCTCGCTCCAGAAG 420	pb Qy
1 CONTOCTOCOUTE A CONTOCTOCOUTE CONTOCTOCOUT	ם מם	301 AAGATCGACAANAGNGTCGAGTTCCTCCGNNCNCAGCTCNACAACAGNGTCTACGGNGTC 360	B 8
1381 CCNTCCTGCCTCGCTGCCGAGGACCCNTCGCTCTCCTATCACTGCAAGGGCCTCGACATT 1440	 0	rceececcec	Db

```
λ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          B,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               엉
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ъ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           ; ORGANISM: Rhodotorula toruloides

PEATURE;

; NAME/KEY: CDS

; LOCATION: (1)..(2148)

US-09-624-693A-18
                                                             * * *
                                                                                                                                                                                                                         岁
                                                                                                                                                                                                                                                                ¥
                                                                                                                                                                                                                                                                                                                     QC
dC
                                                                                                                                                                                                                                                                                                                                                                                λĈ
                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   RESULT 2
US-09-624-693A-18
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  APPLICANT: Yoshida, Roberta
APPLICANT: Kootstra, Anna
APPLICANT: Kootstra, Anna
TITLE OF INVENTION: Phenylalanine Ammonia Lyase Polypeptide and
TITLE OF INVENTION: Polynucleotide Sequences and Methods of Obtaining and
TITLE OF INVENTION: Using Same
FILE REFERENCE: 29479/500NSC
CURRENT APPLICATION NUMBER: US/09/624,693A
CURRENT APPLICATION UNBER: US/09/624,693A
CURRENT FILING DATE: 2000-07-24
NUMBER OF SEQ ID NOS: 25
SOFTWARE: Patentin Ver. 2.0
SEQ ID NO 18
LENGTH: 2439
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Query Match 68.7
Best Local Similarity 79.4
Matches 1913, Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Sequence 18, Application US/09624693A Patent No. 6355468 GENERAL INFORMATION:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    TYPE: DNA
                                                                                                                                                                                                                                                                                                                                      397
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    301
                                                                                                                             517
                                                                                                                                                                                                                                 457
                                                                                                                                                                                                                                                                                    481
                                                                                                                                                                                                                                                                                                                                                                                        421
                                                                                                                                                                                                                                                                                                                                                                                                                                        337
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          181 ACCCCACCONNACONACONNUTCOAACTCGACGGGTACACCCTCACCCTCGGNGACGTCG 240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      13
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1 ATGGCCCCCTCCNTCGACTCGATCGCGACCTCGNTCGCCAACGGCNTCNCNAACGGNTNG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   AAGATCGACAANAGNGTCGAGTTCCTCCGNNCNCAGCTCNACAACAGNGTCTACGGNGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CACGCCGNNCCGNCNNNGNCGNCNACGGGCGCCACGTCCACNCTCNGNCGGCCGNCGCNG 120
                                                                  AACTTCCTCAACCACGGCATCACCCCCATCGTCCCCCTCCGGGGCACCATCTCGGGGTCG 660
                                                                                                                                                            GTCAACTCGCTCACNCGCCGCCACTCGGCNGTCCGCCTCGTCCTCCTCCGAGGCCCTCACC
                                                                                                                                                                                                                                                                   GGNCGCGGCCTCGAGAACTCGCTTCCGCTCGAGGTCGTCCGCGGCGCCCATGACCATCCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             ACGACTGGTTTCGGCGGCTCGGCCGACACCCCGGACTGAGGATGCNATCTCGCTCCAGAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      TCTCGGCCGCGAGGAAGGGCAGGCCTGTCCGCGTCAAGGACAG-CGACGAGATCCGCTCA 276
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GCTCGCACCTGCCCACAACCCAGGTCACGCAGGTCGACATCGTCGAGAAGATGCTCGCCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GCTCGCTCCTCCGACCACCCAGNNGACGCAGCTCGACATCGTNGAGNAGATCCTCGCCG
                           AACTICCTCAACCACGGCATCACCCCCATCGTCCCCCCTCCGCGGCACCATCTCTGCGTCG
                                                                                                                                                                                                                                                                                                                                   GCTCTCCTCGAGCACCAGCTCTGCGGTGTTCTCCCCTTCGTCGTTCGACTCGTTCCGCCTC
                                                                                                                                                                                                                                                                                                                                                                                   GCNCTCCTCGAGCACCAGCTCTGCGGTGTNCTCCCNACGTCGNTCGANTCCTTCNGCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                          ACGACTGGATTTGGCGGATCCGCAGACACCCGCACCGAGGACGCCATCTCGCTCCAGAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  AAGATTGACAAATCGGTCGAGTTCTTGCGCTCGCAACTCTCCATGAGCGTCTACGGCGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        TCGGCGCCGCNCGCAAGGGCCGCNCNGTCCGCGTCNCAGACAGNCGACGAGATCCGCGCA 300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CGCCGACCGACTCGA----CGCTCGAACTCGACGCTACTCGCTCAACCTCGGAGACGTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           ATGGCACCCTCGACTCGATCTCGCACTCGTTCGCAAACGGCGTCGCATCCGCAAAG
                                                                                                                          GTCAACAGCTTGACCCGCGCCACTCGGCTGTCCGCCTCGTCGTCGAGGCGCTCACC
                                                                                                                                                                                                                                    GGCCGCGGTCTCGAGAACTCGCTTCCCCTCGAGGTTGTTCGCGGCGCCATGACAATCCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     68.7%;
79.4%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            0,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Score 1699.4; DB 4; Length 2439;
Pred. No. 3.2e-305;
O; Mismatches 459; Indels 36; Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      ---CAATGGCGCCTCGACCAACCTC----GCAGTCGCAG 100
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  160
                           636
                                                                                                                                                                                                                                 516
                                                                                                                                                                                                                                                                                 540
                                                                                                                                                                                                                                                                                                                                      456
                                                                                                                                                                                                                                                                                                                                                                                        480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  336
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           60
                                                  당
                                                                                                 Ś
                                                                                                                                                      밁
                                                                                                                                                                                                8
                                                                                                                                                                                                                                                           뮍
                                                                                                                                                                                                                                                                                                    Ş
                                                                                                                                                                                                                                                                                                                                                            В
                                                                                                                                                                                                                                                                                                                                                                                                         Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            망
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            ₽
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          8
                                                                                                                                                                                                                                                                                                                                                               1477
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1081
                                                                                                                                                      1597
                                                                                                                                                                                                                                                           1537
                                                                                                                                                                                                                                                                                                             1561
                                                                                                                                                                                                                                                                                                                                                                                                                 1501
                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1417
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1441
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1357
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1381
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1297
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1237
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1261
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1201
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1117
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1141
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1057
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1021
1741 CTCGNGGACAAGGTCAACAAGNCGCTCNACAAGCGNCTCGAGCAGACCAACTCGTACGAC 1800
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        997
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             937
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               196
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 877
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   901
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     817
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        841
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             757
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              781 TINGGICTCGAGCCCGTCCTCCGGCCCGAAGGAGGGTCTCGGTCTCCGTCAACGGCACG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  199
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   GGCGACCTCTCCCCTTCCTACATTGCAGCGGCCATCAGCGGTCACCCGGACNNCAAG
                                                                                                                                                                                                                                                                                               GCCGCNGCNGCNTACACTTCCGGAGCTCGGNCACCTTGCCAACCCGTNACGACCCACGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   GGCAAGCTCAACTTCACGCAGCTCACCGAGATGCTCAACGCCGGCATGAACCGCGGCCTN 1380
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     TCGACGACCACCACCGCTCATCGACGTCGAGAACAAGANGACCCACCACGGCGGCAAC 1260
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GGCCCGCTCGTCAGCGACATGATTCACGCCCACGCNGTCCTCTCGCTCGAGGCCGGNCAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GACGACGAGGGCATTCTCCGCCAGGACCGCTACCCGCTCGCCACGTCGCCTCAGTGGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CGCACGCTCCTCGAGGGCAGCNNGTTTGCCGTCCACCACGAGGAGGAGGTCAAGGTCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CCNTTCCTCCACGACGTCACGCGCCCTCACCCGACCCAGATCGAGGTCGCGCGCAACATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     TCGCAGGCGCTCACGGCTCTNACGGTCGAGGCCATGGTCGGCCACGCCGGCTCGTTCCAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GCCGTCTCAGCATCGATGGCCACCCTCGCTCTGCACGACGCACACATGCTCTCGCTCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          GCCGTCTCCGCCTCGATGGCGACCCTCGCTCTGCACGACGCACACATGCTCTCGCTCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               TTCAACCTCGAGCCCGTCGTCCTCGGCCCGAAGGAAGGTCTCGGTCTCGTCAACGGCACC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 GTNCACGTNNTNCACGAGGGCANNGAGAAGATCATGTNCGCCCGCGAGGCGATCGCGCTC
                                                     GTCTCGCTCATCGACCAGCACTTTGGCTCCGCCATGACCGGCTCGAACCTGCGCGACGAG 1716
                                                                                                    CAAGCCATCGACTTGCGCGCGATCGAGTTCGAGTTCAAGAAGCAGTTCGGCCCAGCCATC
                                                                                                                                                                                                        CAGGCCGTCGACCTCCGCGCGATGGAGTTCGAGTTCAAGAAGCAGTTCGACCCGNTNNTC
                                                                                                                                                                                                                                                           CAGCCGGCNGAGATGGGCAACCAGGCCGTCAACTCGCNCTCATCTCGGCNCGCCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                      GCCGCTGCGGCGTACACCTCGGAGTTGGGACACCTCGCCAACCCTGTGACGACGCATGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CCCTCCTGCCTCGCGGCCGAAGACCCCCTCGCTCCTACCACTGCAAGGGCCTCGACATC 1416
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          confected transfer of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the confection of the conf
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GGCAAGCTCAACTTCACGCAGCTCACCGAGATGCTCAACGCCGGCATGAACCGCGGCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      TTCCAGGCTGCCGCTGTGGCCAACACCATGGAGAAGACTCGCCTCGGGCTCGCCCAGATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           TCGACGACCGACAACCCTCTCATCGACGTCGAGAACAAGACTTCGCACCACGGCGGCAAT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GACGACGACGACTCTCCGCCAGGACCGCTACCCCTTGCGCACGTCTCCTCAGTGGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CGCAAGCTCCTCGAGGGAAGCCGCTTTGCTGTCCACCATGAGGAGGAGGTCAAGGTCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               CCCTTCCTTCACGACGTCACGCGCCCTCACCCGACGCAGATCGAAGTCGCGGGAAACATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 receaenceencaeeceneaecenceaaeceareerceeceaececeecreerrecae
                                                                                                                                                                                                                                                                                                                                                                  CAGCCGGCTGAGATGGCGAACCAGGCGGTCAACTCGCTTGCGCTCATCTCGGCTCGTCGC
                                                                                                                                                                                                                                                                                                                                                               1536
                                                                                                                                                                                                                                                                                                                                                                                                                    1560
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1020
                                                                                                                                                                                                           1680
                                                                                                                                                                                                                                                                                                                1620
                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1476
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1356
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1296
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1320
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1176
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1200
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1080
                                                                                                                                                                                                                                                                1596
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1500
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1440
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1236
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1116
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1056
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       936
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        876
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               816
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               840
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    756
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        969
```

```
RESULT 3
US-09-624-693A-12
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Вb
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Вb
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      맑
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              맑
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        8
                                                                                                                                                                                                                                                                                                       Sequence 12, Application US/09624693A

Patent No. 6355468

GENERAL INFORMATION:
APPLICANT: Yoshida, Roberta
APPLICANT: Kootstra, Anna
TITLE OF INVENTION: Phenylalanine Ammonia Lyase Polypeptide and
TITLE OF INVENTION: Polynuclectide Sequences and Methods of Obtaining
TITLE OF INVENTION: Using Same
TITLE OF INVENTION: Using Same
TITLE REFERENCE: 29479/500NSC
CURRENT APPLICANTECN NUMBER: US/09/624,693A
CURRENT FILING DATE: 2000-07-24
NUMBER OF SEQ ID NOS: 25
                                                                                                                                                                                                SOFTWARE: PatentIn Ver. 2.0
SEQ ID NO 12
LENGTH: 2419
TYPE: DNA
                                                                               NAME/KEY: CDS
LOCATION: (37)..(2196)
                                                                                                                                            ORGANISM: Rhodotorula graminis FEATURE:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1861 NNGTCCTCGCCNNNNGCCANNAGGTCTCGCTCGCNGCCGTCAACGCCTGGAAGGTCGCCT 1920
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1801 CTCGAGCCGCGCTGGCACGACGCCTTCTCGTTCGCGACCGGCACCGTCGTCGAGNNNNNN 1860
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             2365 CGCATAAA 2372
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 2401 NNNANAA 2408
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               2341 NGTHNNICAINNNACHCHTNNINNNAINCNGGNAINNGANTHNANGHNTNCGNGNINCHNINNN 2400
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             2281 THUMNICHTUNCTCHCHUNNANCHNGTCHUTHNMHICTHNIGHNTHNHNHNHCHNHC 2340
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       2186 TATCCCGCCTGCACTCTTAGGACTCGCTTCTTGTCGGACTCGGATCTCGCATCGCTTCTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           2161 ACGTCCTCGTCAAGATGCTCGCNTAGNNNCNCNNNCNANNCTCGCNTNNNNNCCNNNCNC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         2101 TGACGATCGGCACCAACGTCTCCCGCATCTACGAGGCCATCAAGNNCGGCNGCATCAACC 2160
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1837 TCGTCGACGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   CCGCCGAGAAGGCCATCTCGCTCACGCGCNANGTCCGCGACNCCTTCTGGNCGGCNCCGT 1980
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        AGTACCCATCCACGCATCCGATAAATCAGGGAGAGAATCTACGCTTGCGGGAGCTTCTTG 2364
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             NNNCCNNNNNNNCTNTTNGNNNTCGNNTCNTGNCNNNNNCGGANNTNNCNNCNNNNNNN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CTCGTCGAGAAGGTGAACAAGACGCTCGCCAAGCGCCTCGAGCAGACCAACTCGTACGAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      TCGTTCTTGGCTGCCTCTC-TAGACCGTGTCCGTATTACCTCGAGATTGTGAATACAAGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    ACGTCCTCCAAGATGCTCGCTTAGACACTCTTCCCACTCTCGCATCCCTTCCATACCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   TCCGCGAGGAGCTCGGCGTCAAGGCCCGCCGCCGCCGCCGCCGTCTTCCTCGGCAAGCAGGAGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 CGACCTCGTCGCCCCGCTACCTCTCGCCGCGCACTCAGATCCTCTACGCCTTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CGTCGTCGTCGCCCGCGCTCNCGTACCTCTCGCCGCGCACGCGCGTCCTGTACTCGTTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CCGCCGAGTCGGCCATCTCGCTCACCCGCCCAAGTCCGCGAGACCTTCTGGTCCGCCGCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     TGACGATCGGCTCGAACGTCTCCAAGATCTACGAGGCCATCAAGTCGGGCAGGATCAACA
      65.8%;
      Score 1629.4;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            GCTCTCGCTCGCCGTCAACGCCTGGAAGGTCGCCG 1885
      B
      4.
      Length 2419;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       2245
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           2220
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          2100
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       2040
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1945
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1776
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    2185
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   2065
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 2005
                                                                                        B
                                                                                                                                      Ś
                                                                                                                                                                                                      묽
                                                                                                                                                                                                                                                   Ş
                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                    8
                                                                                                                                                                                                                                                                                                                                                                                                                                 片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          ᅜ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Best Local Similarity 78.0 Matches 1879; Conservative
1021 CGCACGCTCCTCGAGGGCAGCNNGTTTGCCGTCCACCACGAGGAGGAGGAGGTCAAGGTCAAG
                                                                                                                                                                                                                                                                901
                                                                                                                                                                                                                                                                                                                      871
                                                                                                                                                                                                                                                                                                                                                                                                                                    811
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        781
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  751
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      721
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                691
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       661
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             631
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    601
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              571
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               541
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         511
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             481
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          451
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             421
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       391
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     331
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    215
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              155
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            97
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                19
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1 ATGGCCCCTCCNTCGACTCGATCGCGACCTCGNTCGCCAACGGCNTCNCNAACGGNTNG
                                                                                                                                                                                                                                                                                                                                                                          GCCGTCTCCGCTCGATGGCGACCCTCGCTCTGCACGACGCACACATGCTCTCGCTCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GTTCACGTTTTGCACGAGGAACCGAGAAGATCATGTTTGCGCGCGAGGCCATCTCGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          GGCGACCTCTCCCCNCTCTCNTACATCGCCGCCCATCACCGGTCACCCGGACNNCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GTCAACTCGCTCACGCGTGGCCACTCGGCCGTCCGTCGTCGTCCTTGAGGCGCTCACC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            GTCAACTCGCTCACNCGCGGCCACTCGGCNGTCCGCCTCGTCGTCCTCGAGGCGCTCACC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       AAGATCGACAANAGNGTCGAGTTCCTCCGNNCNCAGCTCNACAACAGNGTCTACGGNGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      TCGGCGCCGCCAAGGGCGCAGGGTCCGCGTC-CAGAACGACGACGAGATCCGCGCA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ACCCCACCGAC---GACGTCGTCGAGCTCAGCGGGTACAGCCTCACCGTCCGTGACGTTG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GCTCGCTCCTCCCGACCACCCAGNNGACGCAGCTCGACATCGTNGAGNAGATCCTCGCCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CACGCCGCTCCGACCAAGTCGGCTGCGGGCCCCACTTCGGCTCTCCGCCGCACGC--CCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CACGCCGNNCCGNCNNGNCGNCNACGGGCGCCACGTCCACNCTCNGNCGGCCGNCGCNG
                                                                                           cogramatica con concorde con contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the contraction of the cont
                                                                                                                                               CONTTCCTCCACGACGTCACGCGCCCTCACCCGACCCCAGATCGAGGTCGCGGGGCAACATC 1020
                                                                                                                                                                                                         TCGCAGGCCTTGACGGCTCTCACGGTGGAGGCCATGGTCGGCCAGCAGGGCTCGTTCGCG
                                                                                                                                                                                                                                                         rcacagacacroacagerrernacagrocaagaccaragrocaccaccagerregrocac
                                                                                                                                                                                                                                                                                                                      GCCGTCTCCGCTCGATGGCGACCCTCAGTCTGCACGACTCGCACATGCTCTCGCTCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                    TTTGGTCTCGAGGCAGTCGTCCTCGGCCCGAAGGAGGGTCTCGGTCTGGTCAACGGAACG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           TINGGICICGAGCCCGTCGTCCTCGGCCCGAAGGAGGGTCTCGGTCTCGTCAACGGCACG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      GINCACGINNINCACGAGGGCANNGAGAAGATCATGINCGCCCGCGAGGCGATCGCGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             GGCGACCTCAGCCCGCTCTCGTACATCGCCGGCGCCATCACCGGGTCACCCCGACGTCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             AACTTCTTGAACCACCGCATCACGCCCATCGTCCCCCTCCGCGGCTCCATCTCGGCGTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              AACTTCCTCAACCACGGCATCACCCCCATCGTCCCCCTCCGCGGCACCATCTCGGCGTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                GONCGCGGCCTCGAGAACTCGCTTCCGCTCGAGGTCGTCGGCGGCGATGACCATCCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          GENETICETCGAGEACEAGETCTGEGGTGTNETCCENACGTCGNTCGANTECTTENGECTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ACCACGGTTTCGGTGGCTCGGCCGACACGGGGCTGAGGATGCAGTCAGCCTCCAGAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        ACGACTGGTTTCGGCGGCTCGGCCGACACCCGGACTGAGGATGCNATCTCGCTCCAGAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CGCGTCGACAAGAGCGTCGACTTCCTCAAGGCCCAGCTTCAGAACTCGGTCTACGGAGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          TCGGCGCCGCNCGCAAGGGCCGCNCNGTCCGCGTCNCAGACAGNCGACGAGATCCGCGCA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          ATGGCCCCTTCCTTGGACTCGCTCGCCACCACCCCAACGCTTTACCAACGCCTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GGACGCGGCCTCGAGAACACGCTTCCGCTCGAGGTCGTCCGCGGCGCCCATGGTCATCCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    ACCCCACCGNNACGNACGNNNTCGAACTCGACGGGTACACCCTCACCCTCGGNGACGTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 GCCTCGATGGCCACGCCGCGCACCAGTCGCAGCTCGAGATCGTGCAGGAGCTCCTCAGCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   78.0%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Pred. No. 2.6e-292;
0; Mismatches 504;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           25;
                                                                                           1050
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 630
                                                                                                                                                                                                                                                                                                                             930
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              840
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            570
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        390
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         330
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             96
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        810
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                750
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   690
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       660
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          450
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       271
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    214
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               154
```

5 B 5 B

```
AGACGATCGGGAGCAACGTCTCGCGCATCTACGAGGCCATCAAGGACGGCCGCATCAACC
                                                    TGACGATCGGCACCAACGTCTCCCGCATCTACGAGGCCATCAAGNNCGGCNGCATCAACC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            NNGTCCTCGCCNNNNGCCANNAGGTCTCGCTCGCNGCCGTCAACGCCTGGAAGGTCGCCT 1920
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CACATCGCTGCTTACGCTTCGGAGCTCGGCCACCTTGCCAACCCGGTCACTACCTTCGTC 1527
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      GCCGCNGCNTACACTTCGGAGCTCGGNCACCTTGCCAACCCGGTNACGACCCACGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        GGCAAGCTCAACTTCACGCAGCTCACCGAGATGCTCAACGCCGGCATGAACCGCGGCCTN 1380
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GGCCCGCTCGTCAGCGACATGATTCACGCCCACGCNGTCCTCTCGCTCGAGGCCGGNCAG 1200
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       GACGACGAGGCATTCTTCGCCAGGACCGCTACCCGCTCCGCACGTCGCCTCAGTTCCTC 1170
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       TCGTCCTCGCCCTCTGCCA--ACGTCACCCTTACTGCCGTCAACGCGTGGAAGGTTGCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CTCGAGCCGCGCTGGCACGCCTTCTCGTTCGCGACCGGCACCGTCGTCGAGNNNNNN 186C
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CTTGCGCTCGAGGTCAAGAAGGCGCTCAACAAGCGTCTCGAGCAGACGACGACGTACGAC 1815
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CCGACTCTCCTCCAGCAGCACCTCGGCACTGGCCTCGACGTC-----AACGCA 1755
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CAGGCCGTCGACCTCCGCGCGATGGAGTTCGAGTTCAAGAAGCAGTTCGACCCGNTNNTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CAGCCGGCNGAGATGGGCAACCAGGCCGTCAACTCGCTCGCNCTCATCTCGGCNCGCCGC 1560
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ACGACGACCGACAACCCGCTCCTCGACGTCGAGAACAAGCAGACCGCGCGCACGGCGCAAC 1287
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          TCGACGACCAACCCGCTCATCGACGTCGAGAACAAGANGACCCACCACGGCGGCAAC 1260
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       GACGACGAGGGCATTCTCCGCCAGGACCGCTACCCGCCTCCGCACGTCGCCTCAGTGGCTC 1140
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CGCACGCTCCTTTCCGGCTCGTTTTGCCGTTGAGCACGAGGAGGAGGACGACGATCAAG 1110
                                                                                                                                                                                                                                                                                                                                                                                                                                                  CGGCCGAGAAGGCCATCTCGCTCACGCGCGAGGTGCGCAACCGCTTCTGGCAGACGCCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CTCGAGCCGCGCTGGCACGACGCCTTCTCGTACGCGACCGGCACCGTCGTCGAGCTCCTC 1875
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             CTCGNGGACAAGGTCAACAAGNCGCTCNACAAGCGNCTCGAGCAGACCAACTCGTACGAC 1800
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CAGGCCGTCGACCTCCGCGCGATGGAGCTCGACTTCAAGAAGCAGTTCGACCCGCTTCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                ACTGCCGAGGCCAACGACGTCCTTTCTCTCCTTCTCGCCTCGCACCTGTACTGCACGCTC 1647
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 CCTTCGTGCCTGCCGAGGACCCGTCGCTCAACTATCACGGCAAGGGCTTGGACATT 1467
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CONTCCTGCCTGCCGAGGACCCNTCGCTCTCTATCACTGCAAGGGCCTCGACATT 1440
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   GGCAAGCTCAACTTCACGCAGTGCACCGAGTTGCTCAACGCTGCCATGAACCGCGGCCTG 1407
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         TTCCAGGCGNCCGCTGTCGCNAACACGATGGAGAAGACTCGCCCTCGCNCTCGCCCTGATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      TGCGCGAGGAGCTCGGCGTGCAGGCGCGCCGCCGACGTGTTTGTCGGCGTGCAGCAGG
                                                                                                                                                                                                                         TCCGCGAGGAGCTCGGCGTCAAGGCCCGCCGCGGCGACGTCTTCCTCGGCAAGCAGGAGG
                                                                                                                                                                                                                                                                                                 CTTCGCAGGCGCCGCGCACGCATACCTCTCGCCGCGCACGCGCGTCCTGTACTCGTTCG
                                                                                                                                                                                                                                                                                                                                                                      cercercercecececronceraccrorececececececerecreracroerrec
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           TTCCAGGCGTCGGCTGTCTCGATTTCGATGGAGAAGACCAGGCTCGCACTCGCCCTCATC
                                                                                                                                                                                                                         2100
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1933
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1707
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1347
    2173
                                                                                                                                                2113
                                                                                                                                                                                                                                                                                                 2053
                                                                                                                                                                                                                                                                                                                                                                          2040
                                                                                                                                                                                                                                                                                                                                                                                                                                                      1993
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1980
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1680
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1587
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1320
```

유왕

유

γQ 망 S 밁 Ş 뮍 Ş D. γŞ 밁 ş 밁 8 B Ś 뮍 8 В 8 g Ş В 8 D, Ş 8 Ş 당

В

```
; OTHER INFORMATION: Description of Artificial Sequence: mutant from ; OTHER INFORMATION: Rhodotorula glutinis US-09-627-216A-9
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             멍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               뮹
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            밁
                                       Ś
                                                                                               밁
                                                                                                                                            Ş
                                                                                                                                                                                               밁
                                                                                                                                                                                                                                         Ś
                                                                                                                                                                                                                                                                                              문
                                                                                                                                                                                                                                                                                                                                      δ
                                                                                                                                                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                                                                                                                                         S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              RESULT 4
US-09-627-216A-9
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        ; SEQ ID NO 9
; LENGTH: 2151
; TYPE: DNA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Sequence 9, Application US/09627216A Patent No. 6368837 GENERAL INFORMATION:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Query Match
Best Local Similarity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Matches 1829;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       APPLICANT: Vannelli, Todd
APPLICANT: Gatenby, Anthony
TITLE OF INVENTION: Bioproduction of para-Hydroxycinnamic Acid
FILE REFERENCE: BC1009 US NA
CURRENT APPLICATION NUMBER: US/09/627,216A
CURRENT FILING DATE: 2000-07-27
PRIOR APPLICATION NUMBER: 60/147,719
PRIOR APPLICATION NUMBER: 60/147,719
PRIOR FILING DATE: 1399-08-06
NUMBER OF SEQ ID NOS: 14
NUMBER OF SEQ ID NOS: 14
NUMBER OF SEQ ID NOS: 14
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 APPLICANT: Sariaslani, Sima F
APPLICANT: Tang, Xiao-Song
APPLICANT: Qi, Wei Wei
APPLICANT: Vannelli, Todd
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     ORGANISM: Artificial Sequence FEATURE:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               2293
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             2281
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               2233
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            2161
                                                                                                                                                                                               101
                                                                                                                                                                                                                                                 121
                                                                                                                                                                                                                                                                                                                                                                                                                                                 ш
                                                                                                                                          ACCCCACCGNNACGNACGNNNTCGAACTCGACGGGTACACCCTCACCCTCGGNGACGTCG 240
                                                                                                                                                                                                                                                                                                                                                 CACGCCGNNCCGNCNNNGNCGNCNACGGGCGCCACGTCCACNCTCNGNCGGCCGNCGCNG 120
                                                                                                                                                                                                                                                                                                                                                                                                                              ATGGCCCCCTCCNTCGACTCGATCGCGACCTCGNTCGCCAACGGCNTCNCNAACGGNTNG 60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                AAAAAAA 2419
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             NNNANAAA 2408
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                NGTNNNCANNNACNCNTNNNNNNANNCNGGNANNGANTNNANGNNTNCGNGNNCNNNNNN 2400
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               NUNCCIMININIMINICTITINGININITCGINITCHTGNCHINININCGGAMITINICHINCHININIMIN 2280
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               ACGTCCTCGTCAAGATGCTCGCGTA-AGGCCCGAGCAAGCCTCGCCTAGACGCCCGCCTC 2232
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ACGTCCTCGTCAAGATGCTCGCNTAGNNNCNCNNNCNANNCTCGCNTNNNNNCCCNNNCNC 2220
TCTCGGCCGCGAGGAAGGCCAGGCCTGTCCGCGTCAAGGACAG-CGACGAGATCCGCTCA
                                               TCGGCGCCCCCCAAGGGCCGCNCNGTCCGCGTCNCAGACAGNCGACGAGATCCGCGCA 300
                                                                                                                                                                                                 GCTCGCACCTGCCCACAACCCAGGTCACGCAGGTCGACATCGTCGAGAAGATGCTCGCCG
                                                                                                                                                                                                                                         GCTCGCTCCTCCGACCCCCAGNNGACGCAGCTCGACATCGTNGAGNAGATCCTCGCCG 180
                                                                                                                                                                                                                                                                                              CAGGCTGT-----GCAGTCGCGCCTCGACCAACCTC-----GCAGTCGCAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                GGTCGTCA-GTACACGTGTATAGAGCCTGGAATGGATTGCAAGTCTTCGAGTTCAAAAAA 2411
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               ACCCCAAGACCAGCTTTTCGACGTCGTGTCGTGCCAAGAACGGACTTTCCTCCATACACA 2292
                                                                                                  CGCCGACCGACTCGA---CGCTCGAACTCGACGGCTACTCGCTCAACCTCGGAGACGTCG
                                                                                                                                                                                                                                                                                                                                                                                                 ATGGCACCCTCGCTCGACTCGATCTCGCACTCGTTCGCAAACGGCGTCGCATCCGCAAAG 60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               TINNINCNTHINCTINNCTCNCHNINANCHNIGTCHNTHNINNNCTHNINGHNTHNINNHNCHNINC 2340
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  TGTCGCCTTACTCTCGCCGTCATCACGTCTCTCAGTTCTTTCGTATCCCGCGTCTCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      65.7%; Score 1626.4; DB 4; 83.7%; Pred. No. 9.3e-292;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                0; Mismatches 322; Indels 35; Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Length 2151;
                                                                                                                                                                                                 160
                                                                                                                                                                                                                                                                                                 100
                                                                                                  217
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ທ
```

Mon

```
1117
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1057
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1081
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1021
                                                                                                                                       1297
                                                                                                                                                                                                                                                                                                                                                                                                       1237
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1261
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       481
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        421
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               337
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       277
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      517
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                541
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       457
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       397
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               937
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                877
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        841
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               757
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                697
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                637
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       661
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               577
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               601
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        997
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        961
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                901
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                817
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        781
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                721
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       GTCAACTCGCTCACNCGCGGCCACTCGGCNGTCCGCCTCGTCGTCGTCGAGGCGCTCACC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GENCGCGGCCTCGAGAACTCGCTTCCGCTCGAGGTCGTCGCGGGCGCCATGACCATCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        ACGACTGGTTTCGGCCGGCCTCGGCCGACACCCGGACTGAGGATGCNATCTCGCTCCAGAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       AAGATCGACAANAGNGTCGAGTTCCTCCGNNCNCAGGTCCNACAACAGNGTCTACGGNGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                GCCGTCTCAGCATCGATGGCCACCCTCGCTCTGCACGACGCACACATGCTCTCGCTCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               GCCGTCTCCGCTCGATGGCGACCCTCGCTCTGCACGACGCACACATGCTCTCCTCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                grace de la contra de la compara de la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra del la contra 
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            GTNCACGTNNTNCACGAGGGCANNGAGAAGATCATCTNCGCCCGCGAGGCGATCGCGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GGCGACCTCTCTCTCTCTACATTGCAGCGGCCATCAGCGGTCACCCGGACAGCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      GGCGACCTCTCCCCCCTCTCNTACATCGCCGCCCATCACCGGTCACCCGGACNNCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      AACTTCCTCAACCACGGCATCACCCCCCATCGTCCCCCTCCGGGGCACCATCTCGGCGTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               ercancacerrences es de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant d
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       GGCGCGGTCTCGAGAACTCGCTTCCCCTCGAGGTTGTTCGCGGCGCCATGACAATCCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ecrerecidade accade refece de reference en contra de receneración de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra 
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    GCNCTCCTCGAGCACCAGCTCTGCGGTGTNCTCCCNACGTCGNTCGANTCCTTCNGCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CONTTOUTOACGACGACGTCACCCCGACCCGACATCGAGGTCGAGGCGACATCATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              TCGCACGCCTCACGCCTCTNACGGTCGACGCCATGGTCGGCCACGCCCGCTCCGTTCCAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        TINGGTCTCGAGCCCGTCGTCCTCGGCCCGAAGGAGGTCTCGGTCTCGTCAACGGCACG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      AACTTCCTCAACCACGGCATCACCCCCATCGTCCCCCTCCGCGGCACCATCTCTGCGTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            TCGACGACCGACAACCCGCTCATCGACGACGAGAACAAGANGACCCACCACCACCGCGCAAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GGCCGCTCGTCAGCGAATAGATTCACGCCCACGCNGTCCTCTCGCTCGAGGCCGGNCAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       gaceaceaegecarrereces consesances en accerraces carecrete a en estado en estado en estado en estado en estado en estado en estado en estado en estado en estado en estado en estado en estado en estado en estado en estado en estado en estado en estado en estado en estado en estado en estado en estado en estado en estado en estado en estado en estado en estado en estado en estado en estado en estado en estado en estado en estado en estado en estado en estado en estado en estado en estado en estado en estado en estado en estado en estado en estado en estado en estado en entre en estado en estado en estado en estado en estado en estado en estado en estado en estado en estado en entre en estado en entre en estado en estado en entre en estado en entre en estado en entre en estado en entre en entre en entre en entre en entre en entre en entre en entre en entre en entre en entre en entre en entre en entre en entre en entre en entre en entre en entre en entre en entre en entre en entre en entre en entre en entre en entre en entre en entre en entre en entre en entre en entre en entre en entre en entre en entre en entre en entre en entre en entre en entre en entre entre en entre en entre en entre en entre en entre en entre en entre en entre en entre en entre en entre en entre en entre en entre en entre en entre en entre en entre en entre en entre en entre en entre en entre en entre en entre en entre en entre en entre en entre en entre en entre en entre en entre en entre en entre en entre en entre en entre en entre en entre en entre en entre en entre en entre en entre entre en entre en entre en entre en entre en entre en entre entre en entre en entre en entre en entre en entre en entre en entre en entre en entre en entre en entre en entre en entre entre entre en entre entre entre entre entre entre entre entre entre entre entre entre entre entre entre entre entre entre entre entre entre entre entre entre entre entre entre entre entre entre entre entre entre entre entre entre entre entre entre entre entre entre entre entre en
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GACGACGAGGCATTCTCCGCCAGGACGCTACCCGCTCCGCACGTCGCCTCAGTGGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        ĊĠĊŖŖĠĊŢĊĊŢĊĠŖĠĠĠŖŖĠĊĊĠĊŢŢŢĠĊŢĠŢĊĊŖĊĊŖŢĠĸĠĠŖĠĠŔĠĠŢĊŖŖĠĠŢĊŖŖĠ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           certrectreaceacereacecereaceceácecas arecanecea con contra con contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra contra co
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       TCGCAGTCGCTCACGGCCATGACGGTCGAAGCGATGGTCGGCCACGCCGCGCTCGTTCCAC 936
                                                                                                                                                                                                                     GGCAAGCTCAACTTCACGCAGCTCACCGAGATGCTCAACGCCGGCATGAACCGCGGCCTN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      ĠĠĊĊĊĠĊŦĊĠŦĊĂĠĊĠĂĊĊŦĊĂŦŦĊĂĊĠĊĊĊĂĊĠĊĊĠŦĊĊŦĆĀĊĊĂŤĊĠĀĠĠĊĊĠĠĊĊĀĠ
CONTOCTGCCTGCCGAGGACCONTCGCTCTCTATCACTGCAAGGGCCTCGACATT
                                                                                                                                       GGCAAGCTCAACTTCACGCAGCTCACCGAGATGCTCAACGCCGGCATGAACCGCGGCCTC
                                                                                                                                                                                                                                                                                                                                                                                                       trecadecrececteresecalcaceareeaeaacaciteecreeeereeecaeare
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   516
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    456
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1020
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    900
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            816
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     840
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            756
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   780
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    696
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           636
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            660
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   576
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            600
                                                                                                                                                                           1356
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1320
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1260
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1176
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1200
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1116
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1140
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1056
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1080
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    960
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    876
                                          1440
                                                                                                                                                                                                                                                                                                                                                                                                                                           1296
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1236
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            996
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ₽
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    멁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   맑
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
```

밁 8 밁 5 망 Ś 망 Ś 밁 5

뮍 S

밁 Š

õ

유양

Ś B S

```
1417
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1441
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1357
                                                                                                                                                                                                                                                                                                                                                                                                                                                 1981
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1837
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1777
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1801
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1717
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1741
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1657
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1681
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1597
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1621
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1537
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1477
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1501
                                                                                                                                                                                    2101
                                                                                                                                                                                                                                                                                                                                                                                      1946
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1886
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1921
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1861 NNGTCCTCGCCNNNNGCCANNAGGTCTCGCTCGCNGCCGTCAACGCCTGGAAGGTCGCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1561
                                                          2161
                                                                                                                         2066
                                                                                                                                                                                                                                                      2006
                                                                                                                                                                                                                                                                                                                        2041
2126
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CAGGCCGTCGACCTCCGCGCGATGGAGTTCGAGTTCAAGAAGCAGTTCGACCCGNTNNTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           cadecedetroadaredecadacededededecaderedecirdecircareredederedec
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CAGCCGGCNGAGATGGGCAACCAGGCCGTCAACTCGCTCGCNCTCATCTCGGCNCGCCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            GCCGCTGCGGCGTACACCTCGGAGTTGGGACACCTCGCCAACCCTGTGACGACGCATGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GCCGCNGCNTACACTTCGGAGCTCGGNCACCTTGCCAACCCGGTNACGACCCACGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ĊŦĊĠŦĊĠĀĠĀĀĠĠŦĠĀĀĊĀĀĠĀĊĠĊŦĊĠĊĊĀĀĠĊĠĊĊŦĊĠĀĠĊĀĠĀĊĊĀĀĊŦĊĠŦĀĊĠĀĊ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 CTCGNGGACAAGGTCAACAAGNCGCTCNACAAGCGNCTCGAGCAGACCAACTCGTACGAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 GTCTCGCTCATCGACCAGCACTTTGGCTCCGCCATGACCGGCTCGAACCTGCGCGACGAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CAAGCCATCGACTTGCGCGCGACCGAGTTCGAGTTCAAGAAGCAGTTCGGCCCAGCCATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  ceacercercecececercreeracercecececececaercaearcercraesecrree
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ccecceáercecercacceceaaerceceáeaacerrererere
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CCGCCGAGAAGGCCATCTCGCTCACGCGCNANGTCCGCGACNCCTTCTGGNCGGCNCCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                credrecedes en de de la companya de la consequencia de la consequencia de la consequencia de la consequencia de la consequencia de la consequencia de la consequencia de la consequencia de la consequencia de la consequencia de la consequencia de la consequencia de la consequencia de la consequencia de la consequencia de la consequencia de la consequencia de la consequencia de la consequencia de la consequencia de la consequencia de la consequencia de la consequencia de la consequencia de la consequencia de la consequencia de la consequencia de la consequencia de la consequencia de la consequencia de la consequencia de la consequencia de la consequencia de la consequencia de la consequencia de la consequencia de la consequencia de la consequencia de la consequencia de la consequencia de la consequencia de la consequencia de la consequencia de la consequencia de la consequencia de la consequencia de la consequencia de la consequencia de la consequencia de la consequencia de la consequencia de la consequencia de la consequencia de la consequencia de la consequencia de la consequencia de la consequencia de la consequencia de la consequencia de la consequencia de la consequencia de la consequencia de la consequencia de la consequencia de la consequencia de la consequencia de la consequencia de la consequencia de la consequencia de la consequencia de la consequencia de la consequencia de la consequencia de la consequencia de la consequencia de la consequencia de la consequencia de la consequencia de la consequencia de la consequencia dela consequencia de la consequencia de la consequencia dela consequencia del la consequencia del la consequencia dela consequencia del la consequencia dela consequencia del la consequencia dela consequencia del la consequencia del la consequencia dela consequencia dela consequencia del la consequencia dela consequencia del la consequencia dela consequencia del la consequencia del la consequencia della consequencia della consequencia della consequencia della consequencia della consequenci
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CTCGAGCCGCGCTGCCACGACCGCTCTCTCGTTCGCGACCGGCACCGTCGTCGAGNNNNNN
                                                                                                                                                                                                                                                                                            TCGGCGAGGAGCTCGGCGTCAAGGCCCGCCGCGGCGACGTCTTCCTCGGCAAGCAGGAGG
                                                                                                                                                                                                                                                                                                                                                                                                                                   cgrcgrcgrcgcgcgcgcrcncgraccrcrcgcgcgcacgcacgrcrgracrcgrrcg
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       TCGTCGACGTC
ACGTCCTCAAGATGCTCGCTTAG
                               ACGTCCTCGTCAAGATGCTCGCNTAG
                                                                                                                         TGACGATCGGCTCGAACGTCTCCAAGATCTACGAGGCCATCAAGTCGGGCAGGATCAACA
                                                                                                                                                                      TGACGATCGAGCCAACGTCTCCCGCATCTACGAGGCCATCAAGNNCGGCNGCATCAACC
                                                                                                                                                                                                                                                         dererederedecereakeerredakeeredeee
   2151
                                                                 2186
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1980
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1885
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1920
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1836
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1860
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1776
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1800
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1680
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1596
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1536
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1560
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1476
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1500
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1945
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1656
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1620
                                                                                                                                                                                                                                                                                                                                      2100
                                                                                                                                                                                                                                                                                                                                                                                                                                                                      2040
                                                                                                                                                                                                                                                                           2065
                                                                                                                                                                                                                                                                                                                                                                                                        2005
                                                                                                                                              2125
```

B 8

음 성 g 8 84 P

S 문 Ş

95 80

8 8

Sequence 9, Application US/09765873A

Patent No. 6521748

GENERAL INFORMATION:
APPLICANT: Tang, Xiao-Song
ITILE OF INVENTION: BIOPRODUCTION OF PARA-HYDROXYCINNAMIC ACII
FILE REFERENCE: BC1009 US CIP
CURRENT APPLICATION UNUMBER: US/09/765,873A
CURRENT FILING DATE: 2001-01-19
PRIOR APPLICATION NUMBER: US/627,216
PRIOR APPLICATION NUMBER: US/627,216
PRIOR APPLICATION NUMBER: US/60/147,719
PRIOR APPLICATION NUMBER: US/60/147,719
PRIOR APPLICATION NUMBER: US/60/147,719
PRIOR APPLICATION NUMBER: US/60/147,719
PRIOR FILING DATE: 1999-08-06
NUMBER OF SEQ ID NOS: 38
SOFTWARE: Microsoft Office 97
SEQ ID NO 9 RESULT 5 US-09-765-873A-9

ACID

```
; LENGTH; 2151
; TYPE: DNA
; ORGANISM: mutant from Rhodotorula glutinis
; FEATURE:
; NAME/KEY: CDS
; LOCATION: (1) ...(2151)
US-09-765-873A-9
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Matches 1829; Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Query Match 65.7%;
Best Local Similarity 83.7%;
                                                                             841
                                                                                                                                                                                                    697
                                                                                                                                                                                                                                                                             63,7
                                                                                                                                                                                                                                                                                                                        661
                                                                                                                                                                                                                                                                                                                                                                 577
                                                                                                                                                                                                                                                                                                                                                                                                      601
                                                                                                                                                                                                                                                                                                                                                                                                                                             517
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             457
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   481
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          397
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 421
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        337
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          277
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        218
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     161
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 181 ACCCCACCGNNACGNACGNNNTCGAACTCGACGGGTACACCCTCACCCTCGGGGACGTCG 240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       121
  901 TCGCAGGCGCTCACGGCTCTNACGGTCGAGGCCATGGTCGGCCACGCCGGCTCGTTCCAC 960
                                                                                                                                                           781
                                                                                                                                                                                                                                        721
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               361 ACGACTGGTTTCGGCGGCTCGGCCGACACCCCGGACTGAGGATGCNATCTCGCTCCAGAAG 420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              61 CAGGCTGT-----GCAGTCGCAGCCTCGACCAACCTC----GCAGTCGCAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     61 CACGCCGNNCCGNCNNNGNCGNCNACGGGCGCCACGTCCACNCTCNGNCGGCCGNCGCNG 120
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1 ATGGCCCCCTCCNTCGACTCGATCGCGACCTCGNTCGCCAACGGCNTCNCNAACGGNTNG 60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      GTCAACTCGCTCACNCGCGGCCACTCGGCNGTCCGCCTCGTCGTCGTCGAGGCGCTCACC 600
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CGCCGACCGACTCGA---CGCTCGAACTCGACGGCTACTCGCTCAACCTCGGAGACGTCG
                                                                  GCCGTCTCCGCCTCGATGGCGACCCTCGCTCTGCACGACGCACACATGCTCTCGCTCCTC 900
                                                                                                                                                      TINGGTCTCGAGCCCGTCGTCCTCGGCCCGAAGGAGGGTCTCGGTCTCGTCAACGGCACG
                                                                                                                                                                                                                                                                                                                                                                                               AACTTCCTCAACCACGGCATCACCCCCATCGTCCCCCTCCGCGCGCATCTCGGCGTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                               GTCAACAGCTTGACCCGCCGCCACTCGGCTGTCCGCCTCGTCGTCGTCGAGGCGCTCACC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          GGCCGCGGTCTCGAGAACTCGCTTCCCCTCGAGGTTGTTCGCGGCGCCATGACAATCCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               GENCECCECCAGAAACTCGCTTCCGCTCGAGGTCGTCCGCGGCGCCATGACCATCCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          GCTCTCCTCGAGCACCAGCTCTGCGGTGTTCTCCCCTTCGTCGTTCGACTCGTTCCGCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    GCNCTCCTCGAGCAGCTGCTGCGGTGTNCTCCCNACGTCGNTCGANTCCTTCNGCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          AAGATCGACAANAGNGTCGAGTTCCTCCGNNCNCAGCTCNACAACAGNGTCTACGGNGTC 360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        TOTOGGOCGAGGAAGGGCAGGCCTGTCCGCGTCAAGGACAG-CGACGAGATCCGCTCA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 TCGGCGCCGCNCGCAAGGGCCGCNCNGTCCGCGTCNCAGACAGNCGACGAGATCCGCGCA 300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 GCTCGCACCTGCCCACAACCCAGGTCACGCAGGTCGACATCGTCGAGAAGATGCTCGCCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GCTCGCTCCTCCCGACCACCCAGNNGACGCAGCTCGACATCGTNGAGNAGATCCTCGCCG
                                                                                                                      TTCAACCTCGAGCCCGTCGTCCTCGGCCCGAAGGAGGGTCTCGGTCTCGTCAACGGCACC 816
                                                                                                                                                                                                                                        GINCACGINNINCACGAGGGCANNGAGAAGAICAIGINCGCCCGCGAGGCGAICGCGCIC 780
                                                                                                                                                                                                                                                                               GGCGACCTCTCTCTCTCTACATTGCAGCGGCCATCAGCGGTCACCCGGACAGCAAG
                                                                                                                                                                                                                                                                                                                        GGCGACCTCTCCCCCNCTCTCNTACATCGCCGCCGCCATCACCGGTCACCCGGACNNCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          ACGACTGGATTTGGCGGATCCGCAGACACCCGGCACGGACGCCATCTCGCTCCAGAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        AAGATTGACAAATCGGTCGAGTTCTTGCGCTCGCAACTCTCCATGAGCGTCTACGGCGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              ATGGCACCCTCGCTCGACTCGATCTCGCACTCGTTCGCAAACGGCGTCGCATCCGCAAAG
                                        GCCGTCTCAGCATCGATGGCCACCCTCGCTCTGCACGACGCACACATGCTCTCGCTCCTC
                                                                                                                                                                                                    GTGCACGTCGTCCACGAGGGCAAGGAGAAGATCCTGTACGCCCGCGAGGCGATGGCGCTC
                                                                                                                                                                                                                                                                                                                                                                 AACTTCCTCAACCACGGCATCACCCCCATCGTCCCCCTCCGCGCACCATCTCTGCGTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Score 1626.4; DB 4; Length 2151;
Pred. No. 9.3e-292;
O; Mismatches 322; Indels 35; Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 160
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              100
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          456
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        276
                                                                                                                                                                                                                                                                                                                                                                                                                                             576
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          516
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          396
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        336
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       180
                                                                                                                                                                                                                                                                                 696
                                                                                                                                                                                                                                                                                                                                                                 636
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              60
                                                                                                                                                           840
                                                                                                                                                                                                    756
                                                                                                                                                                                                                                                                                                                      720
                                                                                                                                                                                                                                                                                                                                                                                                      660
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     217
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          S
                                                            밁
                                                                                              Ş
                                                                                                                                       밁
                                                                                                                                                                            Ś
                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                        Ś
                                                                                                                                                                                                                                                                                                   망
                                                                                                                                                                                                                                                                                                                                     5
                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                   8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              á
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       문
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ś
                                                                                                                                          1837
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1537
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1477
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1417
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1357
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1381
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1297
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1321
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1237
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1177
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1201
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1117
1981 CGTCGTCGCCGCGCGCTCNCGTACCTCTCGCCGCGCACGCGCGCGCGTGCTGTACTCGTTCG
                                                                                                                                                                                1861
                                                                                                                                                                                                                       1777
                                                                                                                                                                                                                                                                1801
                                                                                                                                                                                                                                                                                                     1717
                                                                                                                                                                                                                                                                                                                                              1741
                                                                                                                                                                                                                                                                                                                                                                                                                         1597
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1621 CAGGCCGTCGACCTCCGCGCGATGGAGTTCGAGTTCAAGAAGCAGTTCGACCCGNTNNTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1561
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1501
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1441
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1261
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1141
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1057
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1081
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1021 CGCACGCTCCTCGAGGCCAGCNNGTTTGCCGTCCACCACGAGGAGGAGGTCAAGGTCAAG
                                                                                                                                                                                                                                                                                                                                                                                     1657 GTCTCGCTCATCGACCAGCACTTTGGCTCCGCCATGACCGGCTCGAACCTGCGCGACGAG 1716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               997
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             937
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      877 TCGCAGTCGCTCACGGCCATGACGGTCGAAGCGATGGTCGGCCACGCCGGCTCGGTTCCAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       961 CCNTTCCTCCACGTCACGCGCCCTCACCCGACCCAGATCGAGGTCGCGCGCCAACATC 1020
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GACGACGACGACGATTCTCCGCCAGGACCGCTACCCGCTCCGCACGTCGCCTCAGTGGCTC
                                                                                                                                                                              NNGTCCTCGCCNNNNGCCANNAGGTCTCGCTCGCNGCCGTCAACGCCTGGAAGGTCGCCT 1920
                                                                                                                                                                                                                                               CTCGAGCCGCGCTCGCCACGACGCCTTCTCGTTCGCGACCGGCACCGTCGTCGTCGAGNNNNNN 1860
                                                                                                                                                                                                                                                                                                       CTCGTCGAGAAGGTGAACAAGACGCTCGCCAAGCGCCTCGAGCAGACCAACTCGTACGAC
                                                                                                                                                                                                                                                                                                                                 CTCGNGGACAAGGTCAACAAGNCGCTCNACAAGCGNCTCGAGCAGACCAACTCGTACGAC 1800
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CAGCCGGCNGAGATGGGCCAACCAGGCCGTCAACTCGCTCGCNCTCATCTCGGCNCGCCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             GCCGCTGCGGCGTACACCTCGGAGTTGGGACACCTCGCCAACCCTGTGACGACGCATGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GCCGCNGCNGCNTACACTTCGGAGCTCGGNCACCTTGCCAACCCGGTNACGACCCACGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             CCCTCCTGCCTCGCGGCCGAAGACCCCCTCGCTCCCTACCACTGCAAGGGCCTCGACATC 1416
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   CCNTCCTGCCTCGCTGCCGAGGACCCNTCGCTCTCTATCACTGCAAGGGCCTCGACATT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           GGCAAGCTCAACTTCACGCAGCTCACCGAGATGCTCAACGCCGGCATGAACCGCGGCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             GGCAAGCTCAACTTCACGCAGCTCACCGAGATGCTCAACGCCGGCATGAACCGCGGGCCTN 1380
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  TCGACGACCACCACCTCTCATCGACGTCGAGAACAAGACTTCGCACCACGGCGGCAAT 1236
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         TCGACGACCGACAACCCGCTCATCGACGTCGAGAACAAGANGACCCACCACGGCGGCAAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    GGCCCGCTCGTCAGCGACATGATTCACGCCCACGCNGTCCTCTCGCTCGAGGCCGGNCAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GACGACGAGGGCATTCTCCGCCAGGACCGCTACCCCTTGCGCACGTCTCCTCAGTGGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               CGCAAGCTCCTCGAGGGAAGCCGCTTTGCTGTCCACCATGAGGAGGAGGTCAAGGTCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             CCCTTCCTTCACGACGTCACGCGCCCTCACCCGACGCAGATCGAAGTCGCGGGAAACATC
                                                              CCGCCGAGTCGGCCATCTCGCTCACCCGCCAAGTCCGCGAGACCTTCTGGTCCGCCGCGT
                                                                                              ccecceaeaaeeccarcrecereaeeeceannereeeeaencerrereeecaecoccer
                                                                                                                                            TCGTCGACGTC-----GCTCTCGCTCGCCCGCCGTCAACGCCTGGAAGGTCGCCG 1885
                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CAAGCCATCGACTTGCGCGCGACCGAGTTCGAGTTCAAGAAGCAGTTCGGCCCAGCCATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CAGCCGGCTGAGATGGCGAACCAGGCGGTCAACTCGCTTGCGCTCATCTCGGCTCGTCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      TTCCAGGCTGCCGCTGTGGCCAACACCATGGAGAAGACTCGCCTCGGGCTCGCCCAGATC
                                                                                                                                                                                                                       CTCGTCCCGCGCTGGCACGACGCCTTCTCCTTCGCCGCCGGCACCGTCGTCGAGGTCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1440
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1356
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1260
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1080
                                                              1945
                                                                                                       1980
                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1656
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1680
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1596
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1536
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1560
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1500
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1320
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1176
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1116
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1056
                         2040
                                                                                                                                                                                                                                                                                                         1776
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1620
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1476
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1296
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1200
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1140
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             996
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          936
```

유상

¥

Я

λ β λĈ Я Ϋ́ 망 Ä 문 3 В 8 문 5 В Ş B 8 밁 Š 밁 Ş 片 8 뮍 Š

US-0-27-216A-7 US-0-27-216A-7 US-0-27-216A-7 Sequence 7, Application US/09627216A Patent No. 636837 GENERAL INCOMPTION: Sima F APPLICANT: Sariasiani, Sima F APPLICANT: Sariasiani, Sima F APPLICANT: Control of the con	Db 1946 CGACCTCGTCGCCGCGCTCTCGTACCTCTCGCCGCGACTCTAGATCCTCTACGCCTTCG 2005  Qy 2041 TCCGCGAGGAGCTCAGGCGTCAAGGCCCGCGGCGACGTCTTCCTCGGCAAGCAGGAGG 2100
B	
Trick country to a consideration of the construction of the cons	

```
CURRENT APPLICATION NUMBER: US/09/765,873A
CURRENT FILING DATE: 2001-01-19
PRIOR APPLICATION NUMBER: US 09/627,216
PRIOR FILING DATE: 2000-07-27
PRIOR APPLICATION NUMBER: US 60/147,719
PRIOR FILING DATE: 1999-08-06
NUMBER OF SEQ ID NOS: 38
SOFTWARE: Microsoft Office 97
SEQ ID NO 7
LENGTH: 2151
                                                                                                                                          ; NAME/KEY: CDS
; LOCATION: (1)..(2151)
US-09-765-873A-7
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             RESULT 7
US-09-765-873A-7
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          멍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                망
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             문
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Дb
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Sequence 7, Application US/09765873A
Patent No. 6521748
GENERAL INFORMATION:
APPLICANT: Tang, Xiao-Song
TITLE OF INVENTION: BIOPRODUCTION OF PARA-HYDROXYCINNAMIC
FILE REFERENCE: BC1009 US CIP
Query Match
Best Local Similarity
                                                                                                                                                                                                                                                                               TYPE: DNA
ORGANISM: Rhodotorula
FEATURE:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         2126
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 2161
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        2101
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1946
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1981
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1886
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          2066
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     2006
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              2041
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1921
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1837
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1777
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1801
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1717
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1861
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1741
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1657
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                NNGTCCTCGCCNNNNGCCANNAGGTCTCGCTCGCNGCCGTCAACGCCTGGAAGGTCGCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         ACGTCCTCCTCAAGATGCTCGCTTAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     ACGTCCTCGTCAAGATGCTCGCNTAG 2186
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           TGACGATCGGCACCAACGTCTCCCGCATCTACGACGCCATCAAGNNCGGCCNGCATCAACC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  TCCGCGAGGAGCTCGGCGTCAAGGCCCGCCGCGGCGACCTCTTCCTCCGCCAAGCAGGAGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             CGTCGTCGTCGCCCGCGCTCNCGTACCTCTCGCCGCGACGCGCGTCCTGTACTCGTTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      CTCGAGCCGCGCTGGCACGACGCCTTCTCGTTCGCGACCGGCACCGTCGTCGAGNNNNNN 1860
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CTCGTCGAGAĀGGTGAĀGĀĞACĞCTCGCCAĀĞCĞCCTCGAĞCAĞACCAĀCTCGTĀCGĀC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      CTCGNGGACAAGGTCAACAAGNCGCTCNACAAGCGNCTCGAGCAGGACCAACTCGTACGAC 1800
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   TGACGATCGGCTCGAACGTCTCCAAGATCTACGAGGCCATCAAGTCGGGCAGGATCAACA 2125
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CGACCTCGTCGCCGCGCGCTCTCGTACCTCTCGCCGCGCACTCAGATCCTCTACGCCTTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              cceccaaerceecarcicacceecaaerceecaaeaccirceeceececer
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ccecceaeaaeeccarcreecreececananerceeceaencerrereecocecer
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               TCGTCGACGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 credrecedescredences rememberedes de consecuences de la consecuence con consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consecuences de consec
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GTCTCGCTCATCGACCAGCACTTTGGCTCCGCCATGACCGGCTCGAACCTGCGCGACGAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               CAAGCCATCGACTTGCGCGCGATCGAGTTCGAGTTCAAGAAGCAGTTCGGCCCAGCCATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   CAGGCCGTCGACCTCCGCGCGATGGAGTTCGAGTTCAAGAAGCAGTTCGACCCGNTNNTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 acoa coda or coda cod control con concerco code code con con con concerco con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant constant con constant con constant con constant con constant con constant con constant con constant con constant con constant constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant con constant cons
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            9
8
8
8
                                                                                                                                                                                                                                                                                                                           glutinis
    . 6%
Score 1623.2; DB 4;
Pred. No. 3.6e-291;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                GCTCTCGCTCGCCGCCGTCAACGCCTGGAAGGTCGCCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    2151
                                       Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          ACID
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         2160
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      2040
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1980
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1885
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1920
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1776
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       2065
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               2100
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        2005
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1945
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1656
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1680
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1596
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1620
```

```
8
                                                         B
                                                                                 Ş
                                                                                                              밁
                                                                                                                                         Ş
                                                                                                                                                                          문
                                                                                                                                                                                                Ş
                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                              8
                                                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                       Š
                                                                                                                                                                                                                                                                                                                                                      뮍
                                                                                                                                                                                                                                                                                                                                                                             Ş
                                                                                                                                                                                                                                                                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                                                                                                                                                                          Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            멍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Matches 1827; Conservative
                            1021
   997
                                                         937
                                                                                     961
                                                                                                                  877
                                                                                                                                               901
                                                                                                                                                                           817
                                                                                                                                                                                                        841
                                                                                                                                                                                                                                                                                               697
                                                                                                                                                                                                                                                                                                                                                       637
                                                                                                                                                                                                                                                                                                                                                                                                                   577
                                                                                                                                                                                                                                     757
                                                                                                                                                                                                                                                                 781
                                                                                                                                                                                                                                                                                                                           721
                                                                                                                                                                                                                                                                                                                                                                                   661
                                                                                                                                                                                                                                                                                                                                                                                                                                               601
                                                                                                                                                                                                                                                                                                                                                                                                                                                                           517
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       541
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   457
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 481
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             397
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         421
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       337
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 277
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         218
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   161
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             101
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 51
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             \vdash
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         卢
                  CGCACGCTCCTCGAGGGCAGCNNGTTTGCCGTCCACCACGAGGAGGAGGAGGTCAAGGTCAAG
                                                                           CONTICCICCACGACGICACGCCCCTCACCCGACCCAGATCGAGGTCGCGCGCAACATC
                                                                                                                                                                                                                                                     TINGGICICGAGCCCGICGICCTCGGCCCGAAGGAGGGICICGGICACGICAACGGCACG
                                                                                                                                                                                                                                                                                                               GTNCACGTNNTNCACGAGGGCANNGAGAAGATCATGTNCGCCCGCGAGGCGATCGCCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          ĠĊŦĊŤĊĠŤĊĠĀĠĊĀĠĊĀĠĊŤĊŤĠĊĠĠŤĠŤŦĊŤĊĊĊŦŦĊĠŤĊĠŦŤĊĠĀĊŤĊĠŦŤĊĊĠĊĊŤĊ
                                                                                                                                    TCGCAGGCGCTCACGGCTCTNACGGTCGAGGCCATGGTCGGCCACGCCGGCTCGTTCCAC
                                                                                                                                                                        GCCGTCTCAGCATCGATGGCCACCCTCGCTCTGCACGACGCTCACATGCTCTCGCTCCTC
                                                                                                                                                                                                        GCCGTCTCCGCCTCGATGGCGACCCTCGCTCTGCACGACGCACACATGCTCTCGCTCCTC
                                                                                                                                                                                                                                                                                                                                                      GGCGACCTGTCTCCTCTCCTACATTGCAGCGGCCATCAGCGGTCACCCGGACAGCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                 AACTTCCTCAACCACGGCATCACCCCCATCGTCCCCCTCCGGCGCACCATCTCGGCGTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           GTCAACTCGCTCACNCGCGGCCACTCGGCNGTCCGCCTCGTCGTCCTCGAGGCGCTCACC
CGCAAGCTCCTCGAGGGAAGCCGCTTTGCTGTCCACCATGAGGAGGAGGTCAAGGTCAAG
                                                        CCCTTCCTTCACGACGTCACGCGCCCTCACCCGACGCAGATCGAAGTCGCGCGGAAACATC
                                                                                                                TCGCAGTCGCTCACGGCCATGACGGTCGAAGCGATGGTCGGCCACGCCGGCTCGTTCCAC
                                                                                                                                                                                                                                  TTCAACCTCGAGCCCGTCGTCCTCGGCCCGAAGGAAGGTCTCGGTCTCGTCAACGGCACC
                                                                                                                                                                                                                                                                                              GTGCACGTCGACGAGGGCAAGGAGAAGATCCTGTACGCCCGCGAGGCGATGGCGCTC
                                                                                                                                                                                                                                                                                                                                                                                GGCGACCTCTCCCCCCTCTCNTACATCGCCGCCGCCATCACCGGTCACCCGGACNNCAAG
                                                                                                                                                                                                                                                                                                                                                                                                              AACTTCCTCAACCACGGCATCACCCCCATCGTCCCCCCTCCGCGCCACCATCTCTGCGTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   GGNCGCGGCCTCGAGAACTCGCTTCCGCTCGAGGTCGTCCGCGGCGCCATGACCATCCGC 540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   GCNCTCCTCGAGCAGCAGCTCTGCGGTGTNCTCCCNACGTCGNTCGANTCCTTCNGCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ACGACTGGTTTCGGCGGCTCGGCCGACACCCGGGCTGAGGATGCNATCTCGCTCCAGAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  AAGATCGACAANAGNGTCGAGTTCCTCCGNNCNCAGCTCNACAACAGNGTCTACGGNGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         ACCCCACCGNNACGNACGNNNTCGAACTCGACGGGTACACCCTCACCCTCGGNGACGTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            GCTCGCTCCCCGACCCACCCAGNNGACGCAGCTCGACATCGTNGAGNAGATCCTCGCCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                        GTCAACAGCTTGACCCGCGCCACTCGGCTGTCCGCCTCGTCGTCGAGGCCCTCACC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GGCCGCGGTCTCGAGAACTCGCTTCCCCTCGAGGTTGTTCGCGGCGCCATGACAATCCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  ACGACTGGATTTGGCGGATCCGCAGACACCCGCACCGAGGACGCCATCTCGCTCCAGAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    reregeegeaggaaggeageererereegeereaaggaeag-egaegareegerea
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               TCGGCGCCGCNCGCAAGGGCCGCNCNGTCCGCGTCNCAGACAGNCGACGAGATCCGCGCA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CGCCGACCGACTCGA----CGCTCGAACTCGACGGCTACTCGCTCAACCTCGGAGACGTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              AAGATTGACAAATCGGTCGAGTTCTTGCGCTCGCAACTCTCCATGAGCGTCTACGGCGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        GCTCGCACCTGCCCACAACCCAGGTCACGCAGGTCGACATCGTCGAGAAGATGCTCGCCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CAGGCTGT-----GCAGTCGCGCCTCGACCAACCTC----GCAGTCGCAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CACGCCGNNCCGNCNNINGNCGNCNACGGGGGGGCGACGTCCACNCTCNGNCGGCCGNCGCNG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            ATGGCACCCTCGCTCGACTCGATCTCGCACTCGTTCGCAAACGGCGTCGCATCCGCAAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      ATGGCCCCCTCCNTCGACTCGATCGCGACCTCGNTCGCCAACGGCNTCNCNAACGGNTNG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     0;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Mismatches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    324;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    35,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Gaps
1056
                          1080
                                                                                    1020
                                                         996
                                                                                                                                              960
                                                                                                                  936
                                                                                                                                                                          876
                                                                                                                                                                                                      900
                                                                                                                                                                                                                                    816
                                                                                                                                                                                                                                                                                                                                                      696
                                                                                                                                                                                                                                                                                                                                                                                  720
                                                                                                                                                                                                                                                                                                                                                                                                                                            660
                                                                                                                                                                                                                                                                840
                                                                                                                                                                                                                                                                                            756
                                                                                                                                                                                                                                                                                                                        780
                                                                                                                                                                                                                                                                                                                                                                                                              636
                                                                                                                                                                                                                                                                                                                                                                                                                                                                        576
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      600
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  516
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            456
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      276
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    396
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              336
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 217
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          160
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      180
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   100
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            60
```

8 8 8

유 성

뮍 S 닭 5

유양

```
1117
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1141
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1777
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1717
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1621
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1537
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1561
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1477
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1501
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1417
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1441
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1357
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1381
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1297
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1321
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1237
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1261
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1177
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1201
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1057
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1081
                                                                                                                     2101
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1801
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1741
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1657
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1681
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1597
                           2066
                                                                                                                                                                                                                               2006
                                                                                                                                                                                                                                                                                                                                   2041
                                                                                                                                                                                                                                                                                                                                                                                                                                        1946
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1981
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1886
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1921
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1837
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1861
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           GACGACGAGGCATTCTCCGCCAGGACCGCTACCCCTTGCGCACGTCTCCTCAGTGGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    GGCCCGCTCGTCAGCGACATGATICACGCCCACGCNGTCCTCTCGCTCGAGGCCGGNCAG 1200
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             GACGACGAGGGCATTCTCCGCCAGGACCGCTACCCGCTCCGCACGTCGCCTCAGTGGCTC 1140
                      | CCGCCGAGAAGGCCAICTCGCICACGCGCNANGICCGCGACNCCITCTGGNCGGCNCCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             NNGTCCTCGCCNNNNGCCANNAGGTCTCGCTCGCNGCCGTCAACGCCTGGAAGGTCGCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              chedrecedecideciaediaecenterectrecedecedecidecidecidediaecere
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 CTCGAGCCGCGCTGGCACGACGCCTTCTCGTTCGCGACCGGCACCGTCGTCGAGNNNNNN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CTCGNGGACAAGGTCAACAAGNCGCTCNACAAGCGNCTCGAGCAGACCAACTCGTACGAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CAGGCCGTCGACCTCCGCGCGATGGAGTTCGAGTTCAAGAAGCAGTTCGACCCGNTNNTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Acea coca de con con la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de la come de l
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CAGCCGGCNGAGATGGGCAACCAGGCCGTCAACTCGCTCGCNCTCATCTCGGCNCGCCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GCCGCNGCNTACACTTCGGAGCTCGGNCACCTTGCCAACCCGGTNACGACCCACGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CCCTCCTGCCTCGCGAGAGACCCCTCGCTCTCCTACCACTGCAAGGGCCTCGACATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CONTECTGCCTGGCTGCCGACGACCONTCGCTCTCCTATCACTGCAAGGGCCTCGACATT 1440
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       GGCAAGCTCAACTTCACGCAGCTCACCGAGATGCTCAACGCCGGCATGAACCGCGGCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GGCAAGCTCAACTTCACGCAGCTCACCGAGATGCTCAACGCCGGCATGAACCGCGGCCTN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                TTCCAGGCTGCCGCTGTGGCCAACACCATGGAGAGACTCGCCTCGGGCTCGCCAGATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   TTCCAGGCGNCCGCTGTCGCNAACACGATGGAGAAGACTCGCCTTCGCNCTCGCCCTGATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      TCGACGACCAACCCGCTCATCGACGTCGAGAACAAGANGACCCACCACGGCGGCAAC 1260
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       TCCGCGAGGAGCTCGGCGTCAAGGCCCGCCGCCGCGGCGACGTCTTCCTCGGCAAGCAGGAGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CTCGTCGAGAAGATGAACAAGACGCTCGCCAAGCGCCTCGAGCAGACCAACTCGTACGAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           GTCTCGCTCATCGACCAGCACTTTGGCTCCGCCATGACCGGCTCGAACCTGCGCGACGAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 CAGCCGGCTGAGATGGCGAACCAGGCGGTCAACTCGCTTGCGCTCATCTCGGCTCGTCGC
                                                                                                                                                                                                                               CGACCTCGTCGCCCCCCCTCTCGTACCTCTCGCCGCGCACTCAGATCCTCTACGCCTTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CCGCCGAGTCGGCCÁTCTCGCTCÁCCCGCCAAGTCCGCGAGACCTTCTGGTCCGCCGCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    ACAACCCTCTCATCGACGTCGAGAACAAGACTTCGCACCACGGCGGCAAT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          ecrerecerececerea a cecereca a consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de consecue de
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1920
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1860
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1800
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1740
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1656
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1620
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1536
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1560
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1476
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1416
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1356
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1380
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1296
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1320
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1236
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1945
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1980
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1885
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1836
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1680
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1596
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1500
                                            2125
                                                                                                                                                                                                                                                                                                                                                    2100
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  2040
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1776
                                                                                                                                     2160
                                                                                                                                                                                                                                          2065
                                                                                                                                                                                                                                                                                                                                                                                                                                                              2005
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Sequence 31, Application US/09765873A

Sequence 31, Application US/09765873A

Patent NO. 6521748

GENERAL INFORMATION:
APPLICANT: Tang, Xiao-Song
ITITLE OF INVENTION: BIOPRODUCTION OF PARA-HYDROXYCINNAMIC ACII
FILE REFERENCE: BC1009 US CIP
CURRENT APPLICATION NUMBER: US/09/765,873A

CURRENT FILING DATE: 2001-01-19
PRIOR APPLICATION NUMBER: US 09/627,216
PRIOR FILING DATE: 2000-07-27
PRIOR APPLICATION NUMBER: US 60/147,719
PRIOR FILING DATE: 1999-08-06
NUMBER OF SEQ ID NOS: 38
SOFTWARE: Microsoft Office 97
SEQ ID NO 31
LENGTH: 2061
TYPE: DNA
ORGANISM: mutant from Rhodotorula glutinis
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  ; FEATURE:
; NAME/KEY: CDS]
; LOCATION: (1)..(2061)
US-09-765-873A-31
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          RESULT 8
US-09-765-873A-31
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              멼
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 맑
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         망
몺
                                                             Š
                                                                                                                                                                 g
                                                                                                                                                                                                                                                                5
                                                                                                                                                                                                                                                                                                                                                                     B &
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              멍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Query Match 65.1%;
Best Local Similarity 85.0%;
Matches 1764; Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        2161
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     111
                                                                                                                                                                                                   477
                                                                                                                                                                                                                                                                                                       591
                                                                                                                                                                                                                                                                                                                                                                                                            417
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          357
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    471
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   297
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        411
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            237
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      351
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           177
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               291
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         118
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              231
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            171
537
                                                                                              651
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                531
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ь
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        ACGTCCTCGTCAAGATGCTCGCNTAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 GCTCCAGAAGGCNCTCCTCGAGCACCAGCTCTGCGGTGTNCTCCCNACGTCGNTCGANTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CTACGGNGTCACGACTGGTTTCGGCGGCTCGGCCGACACCCCGGACTGAGGATGCNATCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   GATCCGCGCAAAGATCGACAANAGNGTCGAGTTCCTCCGNNCNCAGCTCNACAACAACAGNGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GENGACGTCGGCGCCCGCAAGGGCCCGCNCNGTCCGCGTCNCAGACAGNCGACGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     ATCCTCGCCGACCCACCGNNACGNNACGNNTCGAACTCGACGGGTACACCCTCACCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      GCAGTCGCAGGCTCGCACCTGCCCACAACCCAGGTCACGCAGGTCGACATCGTCGAGAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    GCCGNCGCNGGCTCGCTCCCGACCACCAGNNGACGCAGCTCGACATCGTNGAGNAG
                                                                                                                                                                                                                                                           | GGCGCTCACCAACTTCCTCAACCACGGCATCACCCCCATCGTCCCCCCTCCGGGGCACCAT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                               GACCATCCGCGTCAACTCGCTCACNCGCGGCCACTCGGCNGTCCGCCTCGTCGTCCTCGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CTACGGCGTCACGACTGGATTTGGCGGGATCCGCAGACACCCGCGAGGACGCCATCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GGAGACGTCGTCTCGGCCGCGAGGAAGGGCAAGGCCTGTCCGCGTCAAGGACAG-CGACGA
                                                       CTCGGCGTCGGGCGACCTCTCCCCCCCTCTCTTACATCGCCGCCGCCATCACCGGTCACCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          grrecedecreedecedes en creadada a creación de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de concea de 
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CTTCNGCCTCGGNCGCGGCCTCGAGAACTCGCTTCCGCTCGAGGTCGTCCGCGGCGCCCAT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         derecadade de referencia de carea de carea de caracter de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra de contra d
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      ĠATĊĊĠĊŢĊĀĀĀĠĀŢŢĠĀĊĀĀAŢĊĠĠŢĊĠĀĠŢŢĊŢŢĠĊĠĊŢĊĠĊĀĀĊŢĊŢĊĊĀŢĠĀĠĊĠŢ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        ATGCTCGCCGCCGACCGACTCGA---CGCTCGAACTCGACGGCTACTCGCTCAACCTC
     crerecerceses de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción
                                                                                                                                                                                                        ĠĠĊĠĊŦĊĄĊĊĄĄĊŦŦĊĊŦĊĄĄĊĊĄĊĠĠĊĄŦĊĄĊĊĊĊĄŦĊĠŦĊĊĊĊĊŦĊĊĠĊĠĠĊĄĊĊĄŦ
                                                                                                                                                                                                                                                                                                                                                                                                                 GACAATCCGCGTCAACAGCTTGACCCGCGGCCACTCGGCTGTCCGCCTCGTCCTCGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Score 1610.4; DB 4; pred. No. 8.2e-289; 0; Mismatches 297;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        2186
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         2151
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Length
```

2061 15;

Gaps

성 유

8

유

В 상 당

ő

5 8 5

590 416

536 650 476

596 710 356 470

530

410

236

296

350 176 117 230 60

290

유 В B 8 B

Ş

8 8 8

	1731 NNNNNACGAACTCGNGGACAAGGTCAACAAGNCGCTCNACAAGCGNCTCGAGCAGACCAA 1790	
	1671 CCCGNTNNTCNCNNCGCTCNTCNAGCAGCACTTTGGCNCNGCCCTCGACGGCNNNNNNNNN 1730	
	1611 CTGCGTNCTCCAGGCCGTCGACCTCCGCGGGATGGAGTTCGAGTTCAAGAAGCAGTTCGA 1670	
	1551 GGCNCGCCGCACNGCCGAGGCCAACGACGTCCTTTCTCTCTCCTCCTCGCCACCCCACCTCTA 1610	
	1491 GACCCACGTCCAGCCGGCNGAGATGGGGAACCAGGCCGTCAACTCGCTCGCTCGCNCTCATCTC 1550	
	1431 CCTCGACATTGCCGCNGCNGCNTACACTTCGGAGCTCGGNCACCTTGCCAACCCGGTNAC 1490	
	1371 CCGCGGCCTNCCNTCCTGCCTCGCTGCCGAGGACCCNTCGCTCTCCTATCACTGCAAGGG 1430	
	1311 CGCCCTGATCGGCAAGCTCAACTTCACGCAGCTCACCGAGATGCTCAACGCCGGCATGAA 1370	
	1251 CGGCGGCAACTTCCAGGCGNCCGCTGTCGCNAACACGATGGAGAAGACTCGCCTCGGCNCT 1310	
	1191 GGCCGGNCAGTCGACGACCGACAACCCGGTCATCGACGTCGAGAACAAGANGACCCAČCA 1250 	
-	1131 TCAGTGGCTCGGCCCGCTCGTCAGCGACCATGATTCACGCCCACGCNGTCCTCTCGCTCGA 1190	
	1071 CAAGGTCAAGGACGACGAGGGCATTCTCCGCCAGGACCGCTACCCCGCTCCGCACGTCGCC 1130	
	1011 GCGCAACATCCGCACGCTCCTCGAGGGCAGCAGCNNGTTTGCCGTCCACCACGAGGAGGAGGT 1070	
	951 CTCGTTCCACCCNTTCCTCCACGACGTCACGCGCCCTCACCCGACCCAGATCGAGGTCGC 1010	
	891 CTCGCTCCTCTCGCAGGCGCTCACGGCTCTNACGGTCGAGGCCATGGTCGGCCACGCCGG 950	
	831 CAACGGCACGGCCGTCTCCGCCTCGATGGCGACCCTCGCTCTGCACGCAC	
	771 GATGGGGTTTNGGTCTGGAGGCGGTGGTCCTGGGCCGGAAGGAGGGTCTCGGTCTCGT 830	
	711 GGACNNCAAGGTNCACGTNNTNCACGAGGGCANNGAGAAGATCATGTNCGCCCGCGAGGC 770	

유 성 유

S B

8 8

В

8 8 8 8 8 8 8 8

8

В

```
Sequence 16, Application US/09624693A

Patent No. 635468

GENERAL INFORMATION:

APPLICANT: Yoshida, Roberta

APPLICANT: Yoshida, Roberta

APPLICANT: Yoshida, Roberta

TITLE OF INVENTION: Polynucleotide Sequences and Methods of Obtaining and

TITLE OF INVENTION: Using Same

FILE REPERENCE: 294791500NGC

CURRENT APPLICATION NUMBER: US/09/624,693A

CURRENT APPLICATION NUMBER: US/09/624,693A

NUMBER OF SEQ ID NOS: 25

SOFTWARE: Patentin Ver. 2.0

DRGANIEM: Rhodotorula mucilaginosa
                                                               Ş
                                                                                                                                 뮍
                                                                                                                                                                                      Ş
                                                                                                                                                                                                                                                                   片
                                                                                                                                                                                                                                                                                                                       8
                                                                                                                                                                                                                                                                                                                                                                                                 망
                                                                                                                                                                                                                                                                                                                                                                                                                                                         8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    ; FEATURE:
; NAME/KEY: CDS
; LOCATION: (646)..(2784)
US-09-624-693A-16
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    RESULT 9
US-09-624-693A-16
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Query Match 64.6%; Score 1598.6; DB 4; Length 2787; Best Local Similarity 82.9%; Pred. No. 1.3e-286; Matches 1812; Conservative 0; Mismatches 330; Indels 44;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         2151 NGCATCAACCACGTCCTCGTCAAGATGCTCGCNTAG 2186
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1966
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          2091
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1906
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        2031
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1846
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1971
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1786
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1911
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1737
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1677
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1791
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   2026 AGGATCAACAACGTCCTCCAAGATGCTCGCTTAG 2061
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1851
   821
                                                               181
                                                                                                                                                                                                121
                                                                                                                                                                                                                                                                                                                                                                                                        646
                                                                                                                                 761
                                                                                                                                                                                                                                                                   706
                                                                                                                                                                                                                                                                                                                                     61
                                                                                                                                                                                                                                                                                                                                                                                                                                       1 ATGGCCCCTTCCNTCGACTCGATCGCGACCTCGNTCGCCAACGGCNTCNCNAACGGNTNG
                                      ACCCCACCGNNACGNACGNNNTCGAACTCGACGGGTACACCCTCACCCTCGGNGACGTCG
                                                                                                                                                                    GCTCGCTCCCGACCACCCAGNNGACGCAGCTCGACATCGTNGAGNAGATCCTCGCCG
                                                                                                                                                                                                                                                               CÁCG-----CCGCCGCCGCCGAACGGTGGCGACGTCCACAAGAAGACGGCCGGTGCTG
                                                                                                                                                                                                                                                                                                                           CACGCCGNNCCGNCNNNGNCGNCNACGGGCGCCACGTCCACNCTCNGNCGGCCGNCGCNG
                                                                                                                                                                                                                                                                                                                                                                                                 ATGGCCCCCCCCGACTCGATCGCGACTTCGGTTGCCAACTCCCTCTCGAACGGGTTG
                                                                                                                                 GCTCCCTCCCCGACCACCGAGACGACCCAGCTCGACATCGTTGAGCGCATCTTGGCCG
acecceececeàcea accada rea a a consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la consecue de la conse
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           AAGCAGGAGGTGACGATCGGCACCAACGTCTCCCGCATCTACGAGGCCATCAAGNNCGGC 2150
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    TCCGCCGCGTCGACCTCGTCGCCCGCGCTCTCGTACCTCTCGCCGCGCACTCAGATCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              NCGGCNCCGTCGTCGTCGCCCGCGCGCTCNCGTACCTCTCGCCGCGCACGCGCGCGTCCTG 2030
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   AAGGTCGCCTCCGCCGAGAAGGCCATCTCGCTCACGCGCNANGTCCGCGACNCCTTCTGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              TACGCCTTCGTCCGCGAGGAGCTTGGCGTCAAGGCCCGCCGCGGAGACGTCTTCCTCGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       TACTCGTTCGTCCGCGAGGAGCTCGGCGTCAAGGCCCGCCGCGGCGACGTCTTCCTCGGC 2090
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CGAGNNNNNNNNGTCCTCGCCNNNNGCCANNAGGTCTCGCTCGCNGCCGTCAACGCCTGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        AAGCAAGAGGTGACGATCGGCTCGAACGTCTCCAAGATCTACGAGGCCATCAAGTCGGGC 2025
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     AAGGTCGCCGCCGAGTCGGCCATCTCGCTCACCCGCCAAGTCCGCGAGACCTTCTGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CGAGGTCCTCGTCGACGTC------GCTCTCGCTCGCCGCCGTCAACGCCTGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Indels 44; Gaps
                                                                                                                                                                                                                                                                   760
                                                                                                                                                                                                                                                                                                                              120
                                                                                                                                                                                                                                                                                                                                                                                                 705
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1965
                                                                                                                                                                                                180
                                                                                                                                                                                                                                                                                                                                                                                                                                                                   60
880
                                                               240
                                                                                                                              820
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1905
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1845
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1970
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1785
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1910
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1736
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1850
```

1141 GGCCGGCTCGTCAGCGACATGATTCACGCCCACGCNGTCCTCGCTCGAGGCCGGNCAG 1200	241 TROGGGCCCCCHAGGGGCCCCCANAGAGCCCCCAACAAGACCACAACACACCCCCAACAACACCCCCC
RESULT 10 US-09-624-693A-14 ; Sequence 14, Application US/09624693A ; Patent No. 6355468 ; Patent No. 6355468 ; GENERAL INFORMATION: APPLICANT: Yoshida, Roberta ; APPLICANT: Yoshida, Roberta ; TITLE OF INVENTION: Phenylalanine Ammonia Lyase Polypeptide and ; TITLE OF INVENTION: Polynucleotide Sequences and Methods of Obtaining and ; TITLE OF INVENTION: Using Same ; FILE REFERENCE: 29479/500NSC ; CURRENT APPLICATION NUMBER: US/09/624,693A ; CURRENT FILING DATE: 2000-07-24	DB 1946 GCCANGGTCAGCTTACCCCACCACCACCTCCACCGACCACCCCCCCC

뫄

Ş

유정

ДĎ Ş 유

Вb

Ş

占 Ş В 5 망 8 B δ B 8 8

Š 유성 음 중

밁 Ş D; Ş Dβ 8 망 S 망 δδ

```
Ş
                                                                                                                                                                                                                                           Β,
                                                                                                                                                                                                                                                                                                          Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ş
                                             S
                                                                                                               B,
                                                                                                                                                                                                                                                                                                                                                                            밁
                                                                                                                                                                                                                                                                                                                                                                                                                                       Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        문
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            ; FEATURE:
; NAME/KEY: CDS
; LOCATION: (18)..(2237)
US-09-624-693A-14
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Query Match 13.0%;
Best Local Similarity 52.8%;
Matches 734; Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              NUMBER OF SEQ ID NOS: 25
SOFTWARE: PATENTIN Ver. 2.0
SEQ ID NO 14
LENGTH: 2311
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  LENGTH: 2311
TYPE: DNA
ORGANISM: Amanita r
                                                                                                                                                                                                                                               1088
                                                                                                                                                                                                                                                                                                             1050
                                                                                                                                                                                                                                                                                                                                                                            1028
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           930
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             908
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         848
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           810
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           899
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      636
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        488
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   345 CAGNGTCTACGGNGTCACGACTGGTTTCGGCGGCTCGGCCGACACCCGGACTGAGGATGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         428
CCACGCNGTCCTCTCGACGACCGACCGACCGACCGACCATCGA 1226
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         NATOTOGOTOCAGAAGGCNCTCCTCGAGCACCAGCTCTGCGGTGTNCTCCCNACGTCGNT
                                                                                                                                                                                                                                                                                                                                                                     TCCCGGTCAAGTAGAATGTGCTGAGAACATTTGGAATTTGCTCGATGGGAGTAAATTGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 TCTGCACGACGCACACATGCTCTCGCTCTCTCGCAGGCGCTCACGGCTCTNACGGTCGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        TTATCCACTCCGAACTTCGCCTCAATTCCTTGGGCCTCAGATTGAAGACATAATCTCCGC
                                                                                                                                                                      CTACCCCCTCGCACGTCGCCTCAGTGGCTCGGCCCGCTCGTCAGCGACATGATTCACGC
                                                                                                                                                                                                                                        TCAGTTAGAAGAGCACGAAGTTCGCCTAGAAGACGATAAATACACCCTTCGGCAGGACCG
                                                                                                                                                                                                                                                                                                   CCCGACCCAGATCGAGGTCGCGCAACATCCGCACGCTCCTCGAGGGCAGCNNGTTTGC 1049
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     esccaresrosacecescores recentarios de la seccares de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución del consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución de la consecución 
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      CCTAAACGAAGCTATCCATCTTGTCTTGTTGGCTCAAGTGTGCACGGCTATGGGGACCGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   GAAAGAACCTCTTGGTATTTTGAATGGGACCGCATTCTCGGCATCTGTGGCAGCTTTAGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 GAAGGAGGGTCTCGGTCAACGGCACGGCCTCTCCGCCTCGATGGCGACCCTCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   AATTGGATCCTCGAAGGATGTCTTGGCTCTGCATAATATCGAACCTTTCCCACTGGAATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 GATCATGINCGCCCGCGAGGCGATCGCGCTCTTNGGTCTCGAGCCCGTCGTCCTCGGCCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   GATTATTGGCAACCCATCAATCAAGGTATATCACGGTCCATCAAAGTCCGGAATTCGCCA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CATCACCGGTCACCCGGACNNCAAGGTNCACGTNNTNC-----ACGAGGGCANNGAGAA 749
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CCTGAGAGGCACCATCTCCTCATCCGGAGATCTGTCTCCCCTATCCTATATCGCAGGCAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CCTCCGCGCACCATCTCGGCGTCGGGCGACCTCTCCCCNCTCTCNTACATCGCCGCCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ATGGGAGTTGATCGAAAAGATGAGAGAACTACTCGCGGCCAATGTGATACCTGTCGTTCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 GATTCGCGGGGCCATTTTGATCCGTATGAATTCGCTAATTCGTGGCCACTCTGGAATCAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               cerceceeceareaceareceereaacreecreacneeceecacreecneree
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 TGAGCCTTTGGACGTCCTACCTCTCCAAGATGCAAATAACACAAGCATGCCAGAGGCGTG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CGANTCCTTCNGCCTCGGNCGCGGCCTCGAG-----AACTCGCTTCCGCTCGAGGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GATGTTGTTGGGGTTTGCCCCTTTTGCAACACCAACATGTAGGGATACTGCCCACCTCGAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  muscaria
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               0
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Score 322.6; DB 4;
Pred. No. 3e-51;
0; Mismatches 625;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           625; Indels 30;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Length 2311;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1027
                                                                                                                                                                                                                                        1147
                                                                                                                                                                                                                                                                                                                                                                     1087
                                                                                                                                                                                                                                                                                                   1109
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    929
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      967
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   907
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    869
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   847
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 809
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   787
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      695
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    667
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  635
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 607
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   575
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  487
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                464
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           427
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             404
```

```
PRIOR APPLICATION NUMBER: US 08/975,316
PRIOR FILING DATE: 1997-11-21
PRIOR PELICATION NUMBER: US 08/713,000
PRIOR FILING DATE: 1996-09-11
PRIOR APPLICATION NUMBER: US 09/169,789
PRIOR FILING DATE: 1998-10-09
PRIOR FILING DATE: 1998-10-09
NUMBER OF SEQ ID NOS: 405
SOFTWARE: FASUSEQ for Windows Version 3.0
SEQ ID NO 245
LENGTH: 1455
       B.
                                                                   Ş
                                                                                                                                                                                                                                                                                   ; TYPE: DNA; Eucalyptus US-09-615-192A-245
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       RESULT 11
US-09-615-192A-245
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         멼
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Sequence 245, Application US/09615192A
Patent No. 6410718
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 GENERAL INFORMATION:
                                                                                                                                                                                                                       Query Match
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     APPLICANT:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                FILE REFERENCE: 11000.1003c4U
CURRENT APPLICATION NUMBER: US/09/615,192A
CURRENT FILING DATE: 2000-07-12
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 TITLE OF INVENTION: Materials and Methods for the TITLE OF INVENTION: Modification of Plant Lignin (
                                                                                                                                                                                 Loca L
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1736
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1707
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1676
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1647
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1616
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1587
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1556
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1527
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1505
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1448
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1467
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1388
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1347
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1328
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1208
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1407 NTCGCTCTCCTATCACTGCAAGGGCCTCGACATTGCCGCNGCNGCNTACACTTCGGAGCT 1466
                                                                                                                                                                                 Similarity
CGGGATCTTCGGCAACGGCACGGAGTCGTGCCACACCCTGCCTCAATCCTCCACCCGAGC
                                                                       CGANTCCTTCNGCCTCGGNCGCGGCCTCGAGAACTCGCTTCCGCTCGAGGTCGTCCGCGG 524
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  ATCTTTCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   TCTCCTCCTCGCCACCCACCTCTACTGCGTUCTCCAGGCCGTCGACCTCCGCGCGGATGGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CGTCGAGAACAAGANGACCCACCACCACGGCGCAACTTCCAGGCGNCCGCTGTCGCNAACAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Havukkala,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      CNCNGCCCT 1715
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          GCGCGAGTTCTTGCCCCGGTCTAGACATCATCATTCGTGAGGAGTTAAGATCGTCATTTGG 1735
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GTTCGAGTTCAAGAAGCAGTTCGACCCGNTNNTCNCNNCGCTCNTCNAGCAGCACTTTGG 1706
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      ATCTCTGATCGCGTCTTACTTGTATATTCTATGCCAAGCTCTCGACCTCCGTGCCCTTCA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             TGTTAACTCCCTGGCGTTGATTTCTGCTCGGGCTACCATCACATCGTTGGAAGTGCTAAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             cercanercecreencrenterececnes en consecuences 
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         -----AGCGACTCCTGGCCCCÁCTCACATTCAGTCGGCAGAAATGCACAAACCAAGC 1555
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CGGNCACCTTGCCAACCCGGTNACGACCCACGTCCAGCCGGCNGAGATGGGCAACCAGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ATCTCTCAACTACCACGCCAAAGGACTAGACATAGCAACTGCGGCCTACGTAGCCGA---
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            TGAATTAGTCAATCCTGCGATGAACCGCGCCTCTGCCGCCTTCAGTAGCTGCCACAGATCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CGAGATGCTCAACGCCGGCATGAACCGCGGCCTNCCNTCCTGCCTCGCTGCCGAGGACCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    AATGGAGAAGACGCGACTTGCTTTACATCACGTTGGCAAATTACTATTTTCCCAGAGCAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        GATGGAGAAGACTCGCCTCGCNCTCGCCCTGATCGGCAAGCTCAACTTCACGCAGCTCAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                TGGGGAGACTGGCGAATCTCACCACGGTGGCAATTTCCAAGCGATGGCTGTAACTAATGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        TTTCCAGACTGTAACGCAGGAGTGTAATTACTTACCAGCTACTGACAATCCACTGATTGA
                                                                                                                                                   Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1744
                                                                                                                                                                                                                                                                                                                         grandis
                                                                                                                                                                                 8.6%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Leonard N.
Ilkka
                                                                                                                                               0
                                                                                                                                                                             Score 213.2; DB 4;
Pred. No. 4.4e-31;
                                                                                                                                               Mismatches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Lignin Content
                                                                                                                                                                                                               Length 1455
                                                                                                                                           12;
                                                                                                                                               Gaps
       651
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1675
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1615
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1504
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1406
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1387
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1327
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1526
```

```
RESULT 12

US-09-615-192A-247

Sequence 247, Application US/09615192A

Patent No. 6410718

GENERAL INFORMATION:
APPLICANT: Blokaberry, Leonard N.
APPLICANT: Blokaberry, Leonard N.
TITLE OF INVENTION: Materials and Methods fo:
TITLE OF INVENTION: Modification of Plant Li;
FILE REFERENCE: 11000.1003c4U

CURRENT APPLICATION NUMBER: US/09/615,192A

CURRENT APPLICATION NUMBER: US 08/975,316

PRIOR APPLICATION NUMBER: US 08/975,316

PRIOR APPLICATION NUMBER: US 08/713,000

PRIOR FILING DATE: 1997-11-21

PRIOR APPLICATION NUMBER: US 08/713,000
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              유성
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              유왕
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        5
                                                                                                                                                                                                                                                                                                                                                                                                                  δÃ
                                                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Дď
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       $
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             음 성
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Вb
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ş
                                                                                                                                                                                                                                                                                                                                                                                                                           1305
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1185
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1125
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1183
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1126
                                                                                                                                                                                                                                                                                                                                                                                   1420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1245
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1243
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1065
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1005
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1069
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1009
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  945
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  885
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            949
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    825
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            889
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      765
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              832
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     705
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               772
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       645
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 712
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 652
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      GTCGCCTCAGTGGCTCGGCCCGCTCGTCAGCGACATGATTCACGCCCACGCCACGCCTCTCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           TCTCGTCAACGGCACGGCCGTCTCCGCCTCGATGGCGACCCCTCGCTCTGCACGACGACGACCACA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             CGAGGCGATCGCGCTCTINGGTCTCGAGCCCGTCGTCCTCGGCCCGAAGGAGGGTCTCGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CCTCGAGGCGCTCACCAACTTCCTCAACCACGCATCACCCCCATCGTCCCCCTCCGCGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 CGCCATGCTCCGGGTCAACACCCTCCTCCAGGGCTACTCCGGCATCCGTTTTGAGAT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CGCCATGACCATCCGCGCAACTCGCTCACNCGCGGCCACTCGGCNGTCCGCCTCGTCGT
                                                                                                                                                                                                                                                                                                                                                                                   GGCGGTTGCGTCCATAGGGAAGCTCATGTTCGCGCA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        GCTCGAGGCCGGNCAGTCGACGACGACAACCCGCTCATCGACGTCGAGAACAAGANGAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       AAAGTTGCACGAGATGGATCCGCTCCAGAAGCCAAAGCAGGACAGGTACGCTCTCAGGAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GGAGGTCAAGGTCAAGGACGACGAGGGCATTCTCCGCCAGGACCGCTACCCGCTCCGCAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        GTCTGCGGCTATAATGGAGCACATTTTGGATGGAAGCGC---TTACGTGAAGGCTGCTAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          GCCGGAGTTCACAGACCACTTGACGCATAAATTGAAGCACCATCCCGGG---CAGATTGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CATACTCGCGGTCCTGTCCGAGGTCCTGTCAGCGATCTTCGCAGAGGTGATGCAGGGGAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CATGCTCTCGCTCTCGCAGGCGCTCACGGCTCTNACGGTCGAGGCCATGGTCGGCCA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            GCTCGTGAACGGCACGGCAGTCGGGTCTGGCCTGGCTTCCATCGTCCTCTTCGAGGCCAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CCGGCCCAACTCCAAGG----CCGTCGGGCCTGATGGGAAGTCCCTGGACGCTGTCGAGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     TCACCCGGACNNCAAGGTNCACGTNNTNCACGAGGGCANNGAGAAGATCATGTNCGCCCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               CACCATCACTGCCTCAGGCGACTTGGTCCCCCTCCCTACATTGCCGGGCTCCTGACGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     caccarcrosecerceseceaccrosecencies on a careera caccarca con concentrate con contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate contrate
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               cecnerecerearececaacereaerreaecea
                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CCTGCACGGGAACTTCCAGGGGACCCCGATTGGTGTCTCCATGGACAACACTCGCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CCACCACGGCGCAACTTCCAGGCGNCCGCTGTCGCNAACACGATGGAGAAGACTCGCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     TGAGAGGGAAATCAATTCGGTCAATGACAACCCGCTGATCGATGTCGCGAGGAACAAGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         TTCTCCCCAGTGGCTAGGGCC---CCAGATTGAGGTGATCCGAGCGGCAACCAAGATGAT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GETCGCGCGAACATCCGCACGCTCCTCGAGGCAGCNNGTTTGCCGTCCACCACGAGGA
                                                                                                                                                                            for the
                                                                                                                                                      Lignin
                                                                                                                                                                                                                                                                                                                                                                                                                             1340
                                                                                                                                                                                                                                                                                                                                                                                        1455
                                                                                                                                                          Content
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1124
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1004
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1068
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1304
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1299
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1182
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1064
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1125
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      944
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1008
                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1419
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1359
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1244
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1184
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1242
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      884
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  948
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          824
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                888
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  831
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       704
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 771
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           644
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   711
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        764
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   PRIOR APPLICATION NUMBER: US 09/
PRIOR FILING DATE: 1998-10-09
NUMBER OF SEQ ID NOS: 405
SOFTMARE: FASKSEQ for Windows Ve
SEQ ID NO 247
LENGTH: 1520
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          g
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            ; TYPE: DNA
; ORGANISM: Pinus
US-09-615-192A-247
                                                                                                                                                                                                                                                                                           8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   문
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    맑
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          8
               밁
                                            Ś
                                                                                            밁
                                                                                                                         Ş
                                                                                                                                                                          밁
                                                                                                                                                                                                           Ş
                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                                                                             Ş
                                                                                                                                                                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                               8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Matches 480;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Query Match
Best Local
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Local Similarity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1151
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1031
                                                                                                                                                                                                                        1508
                                                                                                                                                                                                                                                                                                        1448
                                                                                                                                                                                                                                                                                                                                                                                          1391
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1211
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1091
                                                       1628
                                                                                                                                         1568
                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1331
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1271
                                                                                                                                                                                 834
                                                                                                                                                                                                                                                                                                                                                                                                                                  654
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  594
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   534
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   477
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         304
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  851
                                                                                               894
                                                                                                                                                                                                                                                                774
                                                                                                                                                                                                                                                                                                                                                  714
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 971
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         244
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                911
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        184
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            124
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  791
               954
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             GCATTCTCCGCCAGGACCGCTACCCGCTCCGCACGTCGCCTCAGTGGCTCGGCCCGCTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              AGCCCGTCGTCCTCGGCCCCAAGGAGGGTCTCGGTCTCGTCAACGGCCACGGCCGTCTCCG
                                                                                                                                                                                                                                                                                                                                                                                                                                TGTTCGCTCAATTCTCAGAGCTTGTGAATGATTACTACAATGGAGGCTTGCCTTCGAATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   T---GGAGATTATCAGATCTGCAACTCACATGATTGAGCGGGAAATCAATTCTGTGAATG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               TCGAGGGCAGCNNGTTTGCCGTCCACCACGAGGAGGAGGTCAAGGTCAAGGACGACGAGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                TCACGGCTCTNACGGTCGAGGCCATGGTCGGCCACGCCCGGCTCGTTCCACCCNTTCCTCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CAGCACTGGCTTCCATTGTGTGTTTCGATGCCAATGTTCTTGCTCTGCTCTCTGAAGTAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                ccrceareccaccrcecrcecaceaceaceacarecrcrcecrcrcrcecaeecec
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            AGCCCTTTGAATTGCAGCCTAAAGAAGGTCTGGCCATTGTCAATGGCACTTCAGTGGGAG
                                                                                                                                AGGCCAACGACGTCCTTTCTCTCCTCCTCGCCACCCTCTACTGCGTNCTCCAGGCCG
                                                                                                                                                                              CCGAACAGCATAACCAGGATGTCAATTCTCTGGGTCTCGTTTCAGCTAGAAAATCTGCCG
                                                                                                                                                                                                                                                                                                    CNGCNTACACTTCGGAGCTCGGNCACCTTGCCAACCCGGTNACGACCCACGTCCAGCCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             ACAACCCGCTCATCGACGTCGAGAACAAGANGACCCACCACGGCGGCAACTTCCAGGCGN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           TCAGCGACATGATTCACGCCCACGCNGTCCTCTCGCTCGAGGCCGGNCAGTCGACGACCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     AGAAGCCAAAGCAGGATCGCTATGCGCTTCGCACTTCGCCTCAGTGGCTCGGCCCTCAGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       TGGACGGGA----GTCTTATATGAAACACGCTGCTAAGCTCCATGAGATGAATCCTCTGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         ACAAGCTGAAGCACCAT---CCTGGCCAAATGGAAGCTGCAGCGATCATGGAGTATGTCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ACGACGTCACGCGCCTCACCCGACCCAGATCGAGGTCGCGCGCAACATCCGCACGCTCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           TOTOTGOCATGTTCTGCGAGGTTATGAATGGGAAGCCTGAGTTTACAGATCCATTAACTC
               TGGATTTAAGGCATCTGGAGGAAAACATGCTGGCCACTGTGAAGCAGATTGTTTCTCAGG
                                                       TCGACCTCCGCGCGATGGAGTTCGAGTTCAAGAAGCAGTTCCACCCGNTNNTCNCNNCGC
                                                                                                                                                                                                                      CNGAGATGGGCAACCAGGCCGTCAACTCGCTCGCNCTCATCTCGGCNCGCCGCACNGCCG 1567
                                                                                                                                                                                                                                                                CTTCTTACACTTCTGAGCTTCTTTACCTGGCAAATCCTGTCACCAGCCATGTACAGAGCG
                                                                                                                                                                                                                                                                                                                                                  TGAGTGGTGGGCCTAATCCCAGCCTGGATTATGGACTGAAAGGGGCCGAGATCGCTATGG
                                                                                                                                                                                                                                                                                                                                                                                        TCGCTGCCGAG----GACCCNTCGCTCTCCTATCACTGCAAGGGCCTCGACATTGCCGCNG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                          ACTICACGCAGCICACCGAGAIGCICAACGCCGGCAIGAACCGCGGCCINCCNICCIGCC 1390
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CACCTATTGGTGTTTCCATGGATAATCTTCGTCTGTCAATTTCAGCAATTGGGAAATTGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      ACAATCCAGTAATTGATGTTGCCAGAGACAAAGCTCTACATGGAGGGAATTTCCAGGGCA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              49.7%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Score 170.2; DB 4;
Pred. No. 3.8e-23;
0; Mismatches 473;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               09/169,789
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Version
                                                                                                   CATACCTGACAGCTCTGTGCCAGGCTG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Length 1520;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                13
13
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Gaps
                                                                                                                                                                                                                                                                                                                                                                                              1447
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  . 1330
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1270
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1210
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1150
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           416
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1090
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1030
                                                                                                                                             1627
                                                                                                                                                                                                                                                                                                             1507
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               303
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 183
                                                                                                                                                                                                                                                                       833
                                                                                                                                                                                                                                                                                                                                                                                                                                      713
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          593
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          533
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            476
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         970
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       910
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           850
                                                                                                                                                                                       893
                                                                                                                                                                                                                                                                                                                                                       773
                      1013
                                                                                                     953
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              4
```

멼 Š Ď, δ

```
Sequence 16475, Application US/09252991A
Patent NO. 6551795
GENERAL INFORMATION:
APPLICANT: Marc J. Rubenfield et al.
TITLE OF INVENTION: NUCLEIC ACID AND AMINO A.
TITLE OF INVENTION: AERUGINOSA FOR DIAGNOSTI
FILE REFERENCE: 107196.136
CURRENT FILING DATE: 1999-02-18
PRIOR APPLICATION NUMBER: US/09/252,991A
CURRENT FILING DATE: 1998-02-18
PRIOR APPLICATION NUMBER: US 60/074,788
PRIOR APPLICATION NUMBER: US 60/094,190
PRIOR FILING DATE: 1998-07-27
NUMBER OF SEQ ID NOS: 33142
SEQ ID NO 16475
TYPE: DNA
ORGANISM: Pseudomonas aeruginosa
US-09-252-991A-16475
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        RESULT 13
US-09-252-991A-16475
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Query Match
Best Local
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Matches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Local Similarity es 572; Conserv
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1748
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1014
  1011
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1688
                                                                                                                                                                                                                                                                                                                                                                                                                                      576
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 516
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 651
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               456
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            591
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            396
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          531
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          336
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          471
                                                                                             951
                                                                                                                                             738
                                                                                                                                                                                           168
                                                                                                                                                                                                                                           678
                                                                                                                                                                                                                                                                                      831
                                                                                                                                                                                                                                                                                                                                        618
                                                                                                                                                                                                                                                                                                                                                                                      771
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          ggcecicaccaactroctcaaccacegcarcaccccatcgreccccccceeeeeeaccar
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               CTCGGCGTCGGGCGACCTCTCCCCCCCTCTCATACATCGCCGCCCATCACCGGTCACCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GACCATCCGCGTCAACTCGCTCACNCGCGGCCACTCGGCNGTCCGCCTCGTCCTCGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CCTGTCCCATGCCGCCGGCGTCGGCGAGGCGCTGGACGCCATGGTGCGGCTGGTCAT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CTTCNGCCTCGGNCGCGGCCTCGAGAACTCGCTTCGGCTCGAGGTCGTCGCGGCGCCAT
  GCGCAACATCCGCACGCTCCTCGAGGGCAGCNNGTTTGCCGTCCACCACGAGGAGGAGGT 1070
                                                  GCCGTTCGATGCGCGATCCATGCCGCGCGCGCGCGTGGGCAGATCGACGTGGCCGC
                                                                                                                                                                                                                                                                                                                                                                                   GATCGCGCTCTTNGGTCTCGAGCCCGTCGTCCTCGGCCCGAAGGAGGGTCTCGGTCTCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                      CCGGGCGCGCCATCGCGGTG---
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 GGACNNCAAGGTNCACGTNNTNCACGAGGGCANNGAGAAGATCATGTNCGCCCGCGAGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 GGGTGCGTCCGGCGACCTGGCGCCTGGCGCACATGTCGCTGGTGCTGATCGGCGAAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               CGCGCTGATCGCGCTGATCAACGCCGAGGTCTATCCGCACATCCCGCTGAAAGGCTCGGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            GCTGCTCAAGGTGAACAGCCTGGCGCGCGGGTTCTCCGGCATCCGCCGAAGGTGATCGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         AAAAGG 1079
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    ACAAGG 1753
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    TAGCCAAGAAAACCCTGAGCACAGGGCTCAACGGGGGAGCTTTTGCCAGGCCGTTTCTGCG 1073
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               TONTONAGOAGOACTITGGONONGCOCTOGACGGONNNNNNNNNNNNNNNNACGAACTCGNGG
                                                                                             CTCGTTCCACCCNTTCCTCCACGACGTCACGCGCCCTCACCCGACCCAGATCGAGGTCGC 101
                                                                                                                                             GTTCGCCGCCGCCACCGTCTGCGGCGGGCTCAGCGTCGAGGCCATGCTCGGTTCGCGGGC
                                                                                                                                                                                           CTCGCTCCTCTCGCAGGCGCTCACGGCTCTNACGGTCGAGGCCATGGTCGGCCACGCCGG
                                                                                                                                                                                                                                        CAATGGCACCCAGGTGTCCACCGCCCTACGCGCGCGCGGGTTGTTCGAGGCCGAGGACCT
                                                                                                                                                                                                                                                                                      ÇAACGGCACGGCCGTCTCGGCTCGATGGCGACCCTCGCTCTGCACGACGCACACATGCT
                                                                                                                                                                                                                                                                                                                                      MAIC J. Rubenfield et al.
VENTION: NUCLEIC ACID AND AMINO ACID SEQUENCES RELATING TO PSEUDOMONAS VENTION: AERUGINOSA FOR DIAGNOSTICS AND THERAPEUTICS
NCE: 107196.136
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                5.3%;
ilarity 46.5%;
Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Score 131.6; DB 4; Length Pred. No. 5e-16; O; Mismatches 606; Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                    - AGTGGCTGCCGGCCGCCGAAGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Length 1548;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     52;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1747
                                                  857
                                                                                                                                             797
                                                                                                                                                                                           950
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 575
                                                                                                                                                                                                                                                                                      890
                                                                                                                                                                                                                                                                                                                                                                                      830
                                                                                                                                                                                                                                                                                                                                                                                                                                 617
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               515
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            650
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       590
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          395
                                                                                                                                                                                                                                                                                                                                      677
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 770
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               710
                                                                                                                                                                                                                                           737
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ຫ
                                                                                                  FILE REFERENCE: 107196.136
CURRENT APPLICATION NUMBER: US/09/252,991A
CURRENT FILING DATE: 1999-02-18
PRIOR APPLICATION NUMBER: US 60/074,788
PRIOR APPLICATION NUMBER: US 60/094,190
PRIOR FILING DATE: 1998-07-27
PRIOR FILING DATE: 1998-07-27
NUMBER OF SEQ ID NOS: 33142
SEQ ID NO 16126
LENGTH: 2295
LENGTH: 2295
CRGANISM: Pseudomonas aeruginosa
CRGANISM: Pseudomonas aeruginosa
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                US-09-252-991A-16126/c
; Sequence 16126, Application US/09252991A
; Patent No. 6551795
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        δÃ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                US-09-252-991A-16126
                                                                                                                                                                                                                                                                                                                                   PATENT NO. FINORMATION:
GENERAL INFORMATION:
GENERAL INFORMATION: Rubenfield et al.
APPLICANT: Marc J. Rubenfield et al.
APPLICANT: Marc J. Rubenfield et al.
FITLE OF INVENTION: AERUGINOSA FOR DIAGNOSTICS AND THERAPEUTICS
FITLE REFERENCE: 107196.136
FITLE REFERENCE: 107196.136
Query Match 5.3%;
Best Local Similarity 46.5%;
Matches 572; Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1431
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1071
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1485
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1670
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1610
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1365
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1551
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1305
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1491
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1245
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1371
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1131
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1311
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1251
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1014
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1191
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1131
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1071
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         954
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    918
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               858
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   TGGGCGCCTGCCAGGGCCTGGACTTCCGCGAGGGCCTGAAGAGTTCGCCGAAGCTGGAGC 1484
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       GACCCACGTCCAGCCGGCNGAGATGGGCCAACCAGGCCGTCAACTCGCTCGCNCTCATCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CAAGGTCAAGGACGACGACGCATTCTCCGCCAGGACCGCTACCCGCTCCGCACGTCGCC 1130
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ACCCGNTNNTCNCNNCGCTCNTCNAGCAGC 1699
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ACTGCGTNCTCCAGGCCGTCGACCTCCGCGCGATGGAGTTCGAGTTCAAGAAGCAGTTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 CGGCAAACGGCTCTGGGCGATGGCCGAGAACGTCCCGCGGGATTCTCGCCGTGGAGTGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CGCCCAGGTCACCGCCGCCGCCGCCAGCCAGCCACAACAAGGCCCCTGGCCCATCCGGCCAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GCAGTTGCCGCCGTTCCTGGTGGCCAACGGCG-----GGGTCAACTCCGGCTTCATGAT 1244
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GGCCGAGATCGGTTCGCTGTCGGAACGGCGCATCTCGCTGATGATGGACATGCACATGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CGCCCTGATCGGCAAGCTCAACTTCACGCAGCTCACCGAGATGCTCAACGCCGGCATGAA 1370
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        AGCC---AACGCGGTGTCCGACAACCCGCTGGTATTCGCCGCCGAGGGCGACGTGATCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GCAGGTGATGGGCGCCTGCCTGACCCAGATGCGCCAGGCCGCCGAGGTGCTGGAGATCGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    reacrescresseres reactions and reactions are reactions and reactions reactions reactions are reactions and reactions are reactions and reactions are reactions and reactions are reactions and reactions are reactions and reactions are reactions and reactions are reactions and reactions are reactions and reactions are reactions and reactions are reactions and reactions are reactions and reactions are reactions and reactions are reactions and reactions are reactions and reactions are reactions and reactions are reactions and reactions are reactions and reactions are reactions and reactions are reactions and reactions are reactions and reactions are reactions and reactions are reactions and reactions are reactions and reactions are reactions and reactions are reactions and reactions are reactions and reactions are reactions and reactions are reactions are reactions.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      CAAGGT----
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 GGCCTATCGCGACCTGCTCACCGCCAGCAGCGAGGTGGCGCGCTCCCATGAGAAGTGCGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GGCNCGCCGCACNGCCGAGGCCAACGACGTCCTTTCTC-TCCTCCTCGCCACCCACCTCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CGTCGACAGCCTGCCGACCTCGGCCAACCAGGAAGACCATGTGTCGATGGCGCCGAACGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CCTCGACATTGCCGCNGCNGCNTACACTTCGGAGCTCGGNCACCTTGCCAACCCGGTNAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CCGCGGCCTNCCNTCCTGCCTCGCTGCCGAGGACCCNTCGCTCTCCTATCACTGCAAGGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CGGCGGCAACTTCCACGCCGAACCGGTGGCGATGGCCGCCGACAACCTGGCCGTGGCGTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      AGGCTCGCCGCCTGCTGCGCGACAAGGTGC
Score 131.6; DB 4;
Pred. No. 5.2e-16;
0; Mismatches 606;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1514
                                                Length
     Indels
                                                  2295;
     52;
  Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                      TO PSEUDOMONAS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1424
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1609
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1550
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1490
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1190
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1310
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1070
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1013
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1364
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1304
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1430
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1130
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1250
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    953
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 917
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1669
     51
```

á 밁 Ś 밁 Ş 밁 8 밁 Ş ğ δ 밁 Ş B Ś B Ş 밁 Š

471

1669

S

95

```
GGCCGGNCAGTCGACGACCACCAACCCGCTCATCGACGTCGAGAACAAGANGACCCACCA 1250
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          GGGTGCGTCCGGCGACCTGGCGCCCGCTGGCGCACATGTCGCTGGTGCTGATCGGCGAAAAG
                          CGTCGÁCAGCCTGCCGACCTCGGCCAACCAGGAAGACCATGTGTCGATGGCGCCGAACGC
                                                                             GACCCACGTCCAGCCGGCNGAGATGGGCAACCAGGCCGTCAACTCGCTCGCNCTCATCTC
                                                                                                                                                                       ccrceacarrecceconeconecaracacrreeeaecrceeoncaccrreecaacceeernac
                                                                                                                                                                                                                            GCAGTTGCCGCCGTTCCTGGTGGCCAACGGCG-----GGGTCAACTCCGGCTTCATGAT
                                                                                                                                                                                                                                                                       cceceeccinconfectecciecciecceaegacconfecterciectarcaciecaaege
                                                                                                                                                                                                                                                                                                                         GGCCGAGATCGGTTCGCTGTCGGAACGGCGCATCTCGCTGATGATGGACATGCACATGTC
                                                                                                                                                                                                                                                                                                                                                                           CGCCCTGATCGGCAAGCTCAACTTCACGCAGCTCACCGAGATGCTCAACGCCGGCATGAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                           GCAGGTGATGGGCGCCTGCCTGACCCAGATGCGCCAGGCCGCCGAGGTGCTGGAGATCGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          TCAGTGGCTCGGCCCGCTCGGCGACATGATTCACGCCCACGCNGTCCTCTCGCTCGA 1190
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CAAGGT----
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               CAAGGTCAAGGACGACGAGGCATTCTCCGCCAGGACCGCTACCCGCTCCGCACGTCGCC 1130
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    GGCCTATCGCGACCTGCTCACCGCCAGCAGCGAGGTGGCGCGCTCCCATGAGAAGTGCGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    GCGCAACATCCGCACGCTCCTCGAGGGCAGCNNGTTTGCCGTCCACCACGAGGAGGAGGT 1070
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    GCCGTTCGATGCGCGTCCATGCCGCGCGCGCCGCCAGCGTGGGCAGATCGACGTGGCCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CTCGTTCCACCCNTTCCTCCACGACGTCACGCGCCCTCACCCGACCCAGATCGAGGTCGC 1010
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      GTTCGCCGCCGCCACCGTCTGCGGCGGGCTCAGCGTCGAGGCCATGCTCGGTTCGCGGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CTCGCTCTCTCGCAGGCGCTCACGGCTCTNACGGTCGAGGCCATGGTCGGCCACGCCGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      CAATGGCACCCAGGTGTCCACCGCCTACGCGCTGCGCGGGGTTGTTCGAGGCCGAGGACCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   CAACGCCACGCCCTCTCCGCCTCGATGGCGACCCTCGCTCTGCACGACGCACACATGCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      earcecerromagneroreaeccercercercesecceaaeeaeccreercreer
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CCGGGCGCCATCGCGGTG------AGTGGCTGCCGGCCGAAGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        GGACNNCAAGGTNCACGTNNTNCACGAGGGCANNGAGAAGATCATGTNCGCCCGCGAGGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       crceecerceeceaccicaccicaccicacicates
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CGCGCTGATCGCCCTGATCAACGCCGAGGTCTATCCGCACATCCCGCTGAAAGGCTCGGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            GGCGCTCACCAACTTCCTCAACCACGGCATCACCCCCATCGTCCCCCTCCGCGGCACCAT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            GACCATCCGCGTCAACTCGCTCACNCGCGGCCACTCGGCNGTCCGCCCTCGTCCTCGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CCTGTCCCATGCCGCCGGCGTCGGCGAGGCGCTGGACGCCATGGTGCGGCTGGTCAT
                                                                                                                                                                                                                                                                                                                                                                                                                              CGGCGGCAACTTCCACGCCGAACCGGTGGCGATGGCCGCCGACAACCTGGCCCTGGCGTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              AGCC---AACGCGGTGTCCGACAACCCGCTGGTATTCGCCGCCGAGGGCGACGTGATCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               GCTGCTCAAGGTGAACAGCCTGGCGCGCGCGGTTCTCCGGCATCCGCCGAAGGTGATCGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CTTCNGCCTCGGNCGCGCCTCGAGAACTCGCTTCCGCTCGAGGTCGTCCGCGGCGCCAT
                                                                                                                            CGCCCAGGTCACCGCCGCGCGCTGGCCAGCGACAACAAGGCCCTGGCCCATCCGGCCAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  -CCAGGACCCCTATTCGCTGCGTTGCCAGCC
                                                                             1550
                                                                                                                                                                                                                                                                                                                                                                           1370
                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1310
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                449
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                506
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  566
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    602
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    662
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      722
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     830
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1004
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1124
                               155
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1064
                                                                                                                            215
                                                                                                                                                                                                                                                                                                                            329
                                                                                                                                                                                                                                                                                                                                                                                                                              389
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    950
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      782
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      890
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           902
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          770
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          944
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          710
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            650
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    APPLICANT: Havukkala, Ileonard N.
APPLICANT: Havukkala, Ilkka
ITITLE OF INVENTION: Materials and Methods for the
ITITLE OF INVENTION: Modification of Plant Lignin
FILL REFERENCE: 11000.1003c4U
CURRENT APPLICATION NUMBER: US/09/615,192A
CURRENT FILING DATE: 2000-07-12
PRIOR APPLICATION NUMBER: US 08/975,316
PRIOR FILING DATE: 1997-11-21
PRIOR FILING DATE: 1997-11-21
PRIOR FILING DATE: 1998-09-11
PRIOR FILING DATE: 1998-10-09
NUMBER OF SEQ ID NOS: 405
SOPTWARE: FastSEQ for Windows Version 3.0
SEQ ID NO 97
LENGTH: 577
                          S
                                                                                                                                                                       В
                                                                                                                                                                                                                    Ş
                                                                                                                                                                                                                                                                            뮹
                                                                                                                                                                                                                                                                                                                 S
                                                                                                                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                RESULT 15
US-09-615-192A-97
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                          맑
                                                                                                                    S
                                                                                                                                                                                                                                                                                                                                                                                                                      S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       US-09-615-192A-97
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Sequence 97, Application US/09615192A Patent No. 6410718
GENERAL INFORMATION:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Matches 285;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Query Match
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       TYPE: DNA
ORGANISM: Pinus
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Local Similarity
1206 GACCGACAACCCGCTCATCGACGTCGACGACAACAAGANGACCCACCACCGCGCGGCAACTTCCA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1670
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1551
                                                                                                                                                                                                                                                                                                                            1026 GCTCCTCGAGGGCAGCNNGTTTGCCGTCCACCACGAGGAGGAGGTCAAGGTCAAGGACGA
                                                                                                                                                                                                                                                                            289
                                                                                                                                                                                                                                                                                                                                                                              232
                                                                                                                                                                                                                                                                                                                                                                                                                              966
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                172
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        846 CTCCGCCTCGATGGCGACCCTCGCCTCGCACGACGCACACATGCTCTCGCTCCTCGCA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         154
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                786 TCTCGAGCCCGTCGTCCTCGGCCCGAAGGAGGGTCTCGGTCTCGTCAACGGCACGGCCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  52
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    ω
4
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       94
                                                                                                                                                                                                                                                                                                                                                                                                                 CCTCCACGACGTCACGCGCCCTCACCCGACCCAGATCGAGGTCGCGCGCAACATCCGCAC 1029
                                                                                                                                                                               GTTGAGCAAACCGAAACAAGACCGCTACGCTCTGCGAACATCGCCACAGTGGTTGGGGCC
                                                                                                                                                                                                                       ceaegecarrerececeaegaegeraececrecrececaegerecreaerececreeeece
                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GATTCTGTCTGCGCTCTTCTGCGAGGTGATGCAAGGGAAACCGGAGTTCGTAGATCCGTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                ecregreaeceacarearreaceceacecuercerereeceaeceaeceeucaereaec
                                                                                                                                                                                                                                                                              CCTCCTCGACGGTAGCGACT---ACGTGAAAGAAGCAGCGCGGCTTCACGAGAAAGACCC
                                                                                                                                                                                                                                                                                                                                                                           AACCCÁCCÁGTTGAAGCAC---CÁCCCAGGGCÁGÁTCGÁAGCCGGCGGCGTCÁTGGAGTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                GGCGCTCACGGCTCTNACGGTCGAGGCCATGGTCGGCCACGCCGGCTCGTTCCACCCNTT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    ACTGCGTNCTCCAGGCCGTCGACCTCCGCGCGATGGAGTTCGAGTTCAAGAAGCAGTTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CGGCAAACGGCTCTGGGCGATGGCCGAGAACGTCCCGCGGGATTCTCGCCGTGGAGTGGC
                                                                             TCCGATCGAAGTCATCCGCGCTGCTACTCACTCCATCGAGCGGGAGATC---AATTCCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  TCTGGAACCGTTTAAACTGCAGCCCAAGGAAGGACTGGCTCTCGTCAACGGCACAGCGGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    AGGCTCGCCGCCTGCTGCGCGACAAGGTGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    ACCCGNTNNTCNCNNCGCTCNTCNAGCAGC 1699
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       TGGGCGCCTGCCAGGGCCTGGACTTCCGCGAGGGCCTGAAGAGTTCGCCGAAGCTGGAGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      GECNEGECECACNGCEGAEGECEAACGAEGTECTTTETE-TECTECTEGECACCEACCTET
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       4.5%;
54.0%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Score 111; DB 4;
Pred. No. 2.8e-12;
0; Mismatches 234
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     234;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Length 577
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Content
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Indels
```

رن --

Gaps

171

905

965

111 845 Ś

951

781 891 841 831 901 771 943

Дb

721

1011

661

유 성

8 8 8 8

밁 Ś 밁 Ş B, Ş D, Ś 뮹

1003

651

711

1063

591

1123

S В Ş 밁 5 뫄 Ş B Ş 문 Ś 밁 Š 멍 Ś 망 Ş

1491

214

1431

274

1205

405 1145 345

462

1085

288

1371

1311

448

1251

1191

1131

565

1071

,				
				÷ 1:
		i.		
		÷		÷
			ł	

```
Result
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Database
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Post-processing: Minimum Match 0%
Maximum Match 100%
Listing first 45 summaries
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Minimum DB
Maximum DB
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Scoring table:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Sequence:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Total number of hits satisfying chosen parameters:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Perfect score:
                                                                                                                                                                                                                                                                                                                                                    Pred. No. is the number of results predicted by chance to have a score greater than or equal to the score of the result being printed, and is derived by analysis of the total score distribution.
                                      1626.4
1626.4
1626.4
1624.8
1624.8
1623.8
                                                                                                                                                                                                 1699.4
                                                                                                                                                                                                                                                                  Score
                                                                                                                                                                             1629
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         seq length: 0
seq length: 2000000000
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      nucleic search, using sw model
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            IDENTITY_NUC
Gapop 10.0 , Gapext 1.0
                                                                                                                                                                                                                                                                                                                                                                                                                          US-09-939-408A-20
2475
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             3304383 seqs, 2515761380 residues
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1 atggccccctccntcgactc.....nnnnnnnnnnnnnnnnnn 2475
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       September 11, 2004, 23:12:54 ; Search time 1606.68 Seconds
       Published_Applications_NA:*
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Copyright
                                                                                                                                                                                                                                                                                                                                                                                                                  /cgn2_6/ptodata/1/pubpna/US09E_PUBCOMB.seq:*
/cgn2_6/ptodata/1/pubpna/US09C_PUBCOMB.seq:*
/cgn2_6/ptodata/1/pubpna/US09_NEW_PUB.seq:*
/cgn2_6/ptodata/1/pubpna/US09_NEW_PUB.seq:*
/cgn2_6/ptodata/1/pubpna/US10A_PUBCOMB.seq:*
/cgn2_6/ptodata/1/pubpna/US10A_PUBCOMB.seq:*
/cgn2_6/ptodata/1/pubpna/US10C_PUBCOMB.seq:*
/cgn2_6/ptodata/1/pubpna/US10_NEW_PUB.seq:*
/cgn2_6/ptodata/1/pubpna/US10_NEW_PUB.seq:*
/cgn2_6/ptodata/1/pubpna/US10_NEW_PUB.seq:*
/cgn2_6/ptodata/1/pubpna/US10_PUBCOMB.seq:*
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 cgn2_6/ptodata/1/pubpna/PCT
                                                                                                                                                                                                                                                                  Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          n2_6/ptodata/1/pubpna/PCT NEW_PUB.seq:*
n2_6/ptodata/1/pubpna/USO6_NEW_PUB.seq:*
m2_6/ptodata/1/pubpna/USO6_PUBCOMB.seq:*
m2_6/ptodata/1/pubpna/USO7_NEW_PUB.seq:*
m2_6/ptodata/1/pubpna/USO7_NEW_PUB.seq:*
m2_6/ptodata/1/pubpna/PCTUS_PUBCOMB.seq:*
m2_6/ptodata/1/pubpna/USO8_NEW_PUB.seq:*
m2_6/ptodata/1/pubpna/USO8_NEW_PUB.seq:*
m2_6/ptodata/1/pubpna/USO8_PUBCOMB.seq:*
     GenCore version 5.1.6 (c) 1993 - 2004 Compugen Ltd
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ptodata/1/pubpna/US07
                                                                                                                                                                                                                                                                  В
                                                      16
16
1 US-09-939-408A-20

US-09-939-408A-19

US-09-939-408A-12

US-09-939-408A-12

US-09-765-873A-9

US-10-188-523B-9

US-10-188-523B-9

US-10-374-366-3

US-10-374-366-13

US-10-374-366-23

US-10-374-366-23

US-10-374-366-23

US-10-374-366-23

US-10-374-366-23

US-10-374-366-23

US-10-374-366-23

US-10-374-366-23

US-10-374-366-23

US-10-374-366-1
                                                                                                                                                                                                                                                                  片
                                                                                                                                                                                                                                                                                                                     SUMMARIES
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 (without alignments)
7750.794 Million cell updates/sec
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   PUBCOMB.seq:*
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              6608766
                                                 Sequence 20, Appl
Sequence 29, Appl
Sequence 18, Appl
Sequence 12, Appl
Sequence 9, Appli
Sequence 23, Appli
Sequence 3, Appli
Sequence 9, Appli
Sequence 9, Appli
Sequence 13, Appl
Sequence 13, Appl
Sequence 13, Appl
                                                                                                                                                                                                                                                                  Description
 Sequence 7, Appli
Sequence 7, Appli
Sequence 1, Appli
```

## ALIGNMENTS

```
US-09-39-408A-20

(S-09-39-408A-2)

(Sequence 20, Application US/09939408A)

Patent No. US20020102712A1

(SENERAL INFORMATION:

APPLICANT: Kootstra, Roberta

APPLICANT: Kootstra, Anna

(TITLE OF INVENTION: Phenylalanine Ammonia Lyase Polypeptide and

TITLE OF INVENTION: Using Same

FILE REFERENCE: 29479/50NSCA

CURRENT APPLICATION NUMBER: US/09/939,408A

CURRENT APPLICATION NUMBER: US/09/939,408A

CURRENT FILING DATE: 2001-08-24

PRIOR APPLICATION NUMBER: US 09/624,693

PRIOR APPLICATION NUMBER: US 09/624,693

PRIOR APPLICATION NUMBER: US 09/624,693

PRIOR APPLICATION NUMBER: US 09/624,693

PRIOR FILING DATE: 2000-07-24

NUMBER OF SEQ ID NOS: 30

SEQ ID NO 20

SEQ ID NO 20

LENGTH: 2475

TYPE: DNA

Application US/09939408A
                                                                                                                                                                 OTHER INFORMATION: n = A or C or G or T; "n" i; OTHER INFORMATION: Description of Artificial S; OTHER INFORMATION: Sequence of SEQ ID NOS: 12, US-09-939-408A-20
                                                                          Best Local Similarity
Matches 2408; Conserv
                                                                                                    Query Match
Best Local
                                                                                                                                                                                                                                                                           NAME/KEY: misc_difference
LOCATION: (13) .. (2475)
                                                                                                                                                                                                                                                                                                                               ORGANISM: Artificial Sequence FEATURE:
                             1 ATGGCCCCCTCCNTCGACTCGATCGCGACCTCGNTCGCCAACGGCNTCNCNAACGGNTNG
86.0%; Score 2128; DB ilarity 100.0%; Pred. No. 0; Conservative 0; Mismatches
                                                                                                                            DВ
                                                                                                                                                                                                   indicates no consensus at that position
Sequence: Consensus
2, 16, and 18
                                                                                                                            9;
                                                                            0;
                                                                                                                            Length 2475;
                                                                          Indels
                                                                            0;
                                                                          Gaps
                             60
```

, p	g 49	D QY	AG AG	99 99	g dg	Db Qy	DB Q9	Db Qy	Уо	B &	Db Qy	g Qy	g &	d dq	Qy Qy	β Q	dd Vy	, B
1081 GACGACGAGGGCATTCTGCGCCAGGACGGCTACCCGGTCGGACGTGGCCTCAGTGGCTC 1140	1021 CGCACGCTCCTCGAGGGCAGCNNGTTTGCCGTCCACCACGAGGAGGAGGTCAAGGTCAAG 1080 	961 CONTTCCTCCACGACGTCACGCGCCCTCACCCGACCCAGATCGAGGTCGCGCGCAACATC 1020	901 TGGCAGGCCTCACGGCTCTNACGGTCGAGGCCATGGTCGGCCACGCCCGGCTCGTTCCAC 960	841 GCCGTCTCCGCCTCGATGGCGACCCTCGCTCTGCACGACGCACACATGCTCTCGCTCCTC 900 841 GCCGTCTCCGCCTCGATGGCGACCCTCGCTCTGCACGACGACACATGCTCTCGCTCCTC 900	781 TINGGTCTCGAGCCCGTCGTCCTCGGCCCGAAGGAGGGTCTCGGTCTACGGCACG 840	721 GTNCACGTNNTNCACGAGGGCANNGAGAAGATCATGTNCGCCCGCGAGGCGATCGCGCTC 780	661 GGCGACCTCTCCCCNCTCTCNTACATCGCCGCCGATCACCGGTCACCCGGACNNCAAG 720	601 AACTTCCTCAACCACGGCATCACCCCCATCGTCCCCCTCCGCGGCACCATCTCGGCGTCG 660	541 GTCAACTCGCTCACNCGCGGCCACTCGGCNGTCCGCCTCGTCGTCCTCGAGGCGCTCACC 600	481 GGNCGCGGGCTCGAGAACTCGCTTCCGCTCGAGGTCGTCCGCGCGCG	421 GCNCTCCTCGAGCACCAGCTCTGCGGTGTNCTCCCNACGTCGNTCGANTCCTTCNGCCTC 480	361 ACGACTGGTTTCGGCCGCCTCGGCCGACACCCGGACTGAGGATGCNATCTCGCTCCAGAAG 420	301 AAGATCGACAANAGNGTCGAGTTCCTCCGNNCNCAGCTCNACAACAGNGTCTACGGNGTC 360 	241 TCGGCGCCGCNCGCAAGGGCCGCNCNGTCCGGCGTCNCAGACAGNCGACGAGATCCGCGCA 300	181 ACCCCACCGNNACGNACGNNNTCGAACTCGACGGGTACACCCTCACCCTCGGNGACGTCG 240	121 GCTCGCTCCCCGACCACCNAGNNGACGCAGCTCGACATCGTNGAGNAGATCCTCGCCG 180	61 CACGCCGNNCCGNCNNGNCGNCNACGGCGCCACGTCCACNCTCNGNCGGCCGNCGCNG 120 61 CACGCCGNNCCGCNCNNGNCGNCNACGGCGCCACGTCCACNCTCNGNCGGCCGNCGCNG 120	ATGGCCCCCTCCNTCGACTCGCATCGCCACCTCGNTCGCCAACGGCNTCNCNAACGGNTNG 6
			····		· · · · · · · · · · · · · · · · · · ·	<del> </del>		<del> </del>								*****		
dd :	o p	& B &	S B 7	S B 7	S B 7	B &	B 7	6 음 #	S B %	B \$	S B 7	S B 6	B 7	S B 2	§ B 1	δ β :	0 B	8
			TOPGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGG			1 2 1 6 6 6			TCANTONAGCAGCACTTTGGGCNGGGCCTCGACGGCNNNNNNNNNN	561 ACNGCCGAGGCCAACGACGTCCTTTCTCTCCTCCTCCCACCCA	CARCOCARCA CONTRACTOR	GAGGCOGCONAGATGGGCAAGCCGGGTAACTGGCGAAGCCGGGTNAGGGCCGCGCCCGCCCCCCCCCC	CONTROL OF THE CONTRO	GCCAAGCTCAACTTCACGCAGCTCACCGAGATGCTCTCTATCACTGCAAGGGCCTCGACATT 144			1201 TCGACGACCACGACCCCCCTCATCGACGAGAACAGAGAACAGAGAGACCACGACGACCACCGCCACCA	1141 GGCCCGCTCGAGCGAATGAATCACGCCCACGCNGTCCTCGCTCGAGGCCGGNCAG 1200

301 AAGATCGACAANAGNGTCGAGTTCCTCCGNNCNCAGCTCNACAACAGNGTCTACGGNGTC	241 TOGGCGCCGCAAGGGCCGCACGCGCGCGCAAAAAAGAACAGACAAGACAAGACAATCCGCGCA 	QY 181 ACCCCACCGNNACGNACGNNTCGAACTCGACGGGTACACCCTCACCCTCGGNGACGTCG 240	QY 121 GCTCGCTCCCGGACCCACCCAGNNGACGCAGCTCGACATCGTNGAGNAGATCCTCGCCG 180	OY 61 CACGCCGNNCCGNCNNNGNCGNCNACGGGGCGCCACGTCCACNCTCNGNCGGCCGCCGC 120	ATGGCCCCTCCHTCGACTCGATCGCGACCTCGNTCGCCAACGGCNTCNCNAACGGNTNG  ATGGCCCCCTCCHTCGACTCGATCGCGACCTCGBTCGCCAACGGCBTCDCVAACGGVTHG 60	Query Match  78.5%; Score 1944; DB 9; Length 2163;  Best Local Similarity 93.2%; Pred. No. 0;  Matches 2037; Conservative 0; Mismatches 126; Indels 23; Gaos 7;		) ORGANISM: Artificial Sequence ) FEATURE: OTHER INFORMATION: Description of Artificial Sequence: Preferred ) OTHER INFORMATION: theoretical sequence based in part on SEO ID NO.20	SOFTWARE: PatentIn Ver. 2.0 SEQ ID NO 29 LENGTH: 2163 TYPE: DNA	PRIOR FILING DATE: 2000-07-24  PRIOR APPLICATION NUMBER: PCT/US01/23270  PRIOR FILING DATE: 2001-07-24  NUMBER OF SEO ID NOS: 30	FILE REFERENCE: 29479/500NSCA CURRENT APPLICATION NUMBER: US/09/939,408A CURRENT FILING DATE: 2001-08-26 PRIOR APPLICATION NUMBER: US 09/624.693	APPLICANT: KOOTSTEA, Anna TITLE OF INVENTION: Phenylalanine Ammonia Lyase Polypeptide and TITLE OF INVENTION: Polynucleotide Sequences and Methods of Obtaining and TITLE OF INVENTION: Polynucleotide Sequences and Methods of Obtaining and	Sequence 29, Application US/09939406A ; Patent No. US20020102712A1 ; GENERAL INFORMATION: APPLICANT: VOSAIda. Roberta	o o	QY 2401 NNNANAAA 2408          Db 2401 NNNANAAA 2408	OY 2341 NGTNINICANNINACNCINTININININANINCNGGNANINGANTINIANGINITINGGNGNICININININ 2400	OY 2281 THNNNCHTNNCTTUNCTTUNCHNNNANCHNGTCHNTHNNNNCTNNNGHNTHNRNNNNNCHNNC 2340 Db 2281 THNNNCHTNNCTUNCTCNCHNNNANCHNGTCHNTHNNNNNCTHNNGHNTHNNNNNNNNCHNNC 2340	QY 2221 NNNCCNNNNNNNCTNTTNGNNNTCGNNTCNTGNCNNNNNCGGANNTNNCNNCNNCNNNNNN 2280
γQ	Qy Db	do do	S & S	}	dg Qy	Qy Db	Db Qy	dg VQ	dd VQ	dg VQ	ДУ	dd VQ	dg VQ	g Q	מם	) B &	g dg	Db Db
1381 CCNTCCTGCCTGCCGAGGACCCNTCGCTCTCTATCACTGCAAGGGCCTCGACATT 1440	1321 GGCAAGCTCAACTTCACGCAGCTCACCGAGATGCTCAACGCCGGCATGAACCGCGGCCTN 1380	TICCAGGGGCCCCCTGTCGCVAACACGATGGAGAAGACTCGCCTCGC	1201 TUGNUGACUGACUGACUGACUGACAGACUCACUGACGACGACGACGACGACGACGACGACGACGACGACGACG	GGCCCGCTCGTCAACGACATGATTCACGCCCACGCNGTCCTCTCGCTCGAGGCCGGNCACGCTCGCTCGAGGCCGGNCACGCTCGCTCGAGGCCGGNCACGCCCCCCCCTCTCGCTCGAGGCCGGACACGCGCTCTCTCT	1081 GACGACGAGGGCATTCTCCGCCAGGACCGCTACCCGCTCCGCACGTCGCCTCAGTGGCTC 1140	1021 CGCACGCTCCTCGAGGGCAGCNNGTTTGCCGTCCACCACGAGGAGGAGGAGGTCAAGGTCAAG 1080	1 CONTICCTCCACGACGTCACGCGCCCTCACCCGACCCAGATCGAGGTCGCGCGCAACATC	901 TCGCAGGCGCTCACGGCTCTNACGGTCGAGGCCATGGTCGACGCCGGCTCGTTCCAC 960	841 GCCGTCTCCGCCTCGATGGCGACCCTCGCTCTGCACGACGACACATGCTCTCGCTCCTC 900	781 TINGGICTCGAGCCCGTCGICCTCGGCCCGAAGGAGGICTCGGTCTCGTCAACGGCACG 840	721 GINCACGINNINCACGAGGGCANNGAGAAGATCATGINCGCCCGCGAGGCGATCGCGCTC 780	661 GGCGACCTCTCCCCCNCTCTCNTACATCGCCGCCGCCATCACCGGTCACCCGGACNNCAAG 720	601 AACTICCTCAACCACGGCATCACCCCCAICGTCCCCCCTCCGCGGCACCATCTCGGCGTCG 660	541 GTCAACTCGCTCACNCGCGGCCACTCGGCNGTCCGCCTCGTCGTCGTCGAGGCGCTCACC 600	401 GANGGCGGCCTCGAGAACTCGCTTCCGCTCGAGGTCGTCCGCGGGGCCATGACCATCCGC 534	21 GUNCICUTUS ANGLACUANCI INCENTIVA NO LICULANDO LOS MINOS ANGLOS CONTROLOS	THE PROPERTY OF THE PROPERTY O	

```
RESULT 3

US-03-334-408A-18

Sequence 18, Application US/09939408A

Patent No. US20020102712A1

GENERAL INFORMATION:
APPLICANT: Yoshida, Roberta
APPLICANT: Yoshida, Roberta
APPLICANT: Yoshida, Roberta
TITLE OF INVENTION: Polynuclectide Sequences and Methods of Obtaining and
TITLE OF INVENTION: Using Same
FILE REFERENCE: 29479/500NSCA
CURRENT APPLICATION NUMBER: US/09/339,408A
CURRENT APPLICATION NUMBER: US/09/339,408A
CURRENT APPLICATION NUMBER: US/09/339,408A
CURRENT APPLICATION NUMBER: US/09/3270
PRIOR APPLICATION NUMBER: US/09/3270
PRIOR APPLICATION NUMBER: US/09/624,693
PRIOR APPLICATION NUMBER: US/09/624,693
PRIOR FILING DATE: 2001-07-24
PRIOR APPLICATION NUMBER: US/09/624,693
PRIOR FILING DATE: 2001-07-24
PRIOR FILING DATE: 2001-07-24
PRIOR FILING DATE: 201-07-24
PRIOR FILING DATE: 201-07-24
PRIOR FILING DATE: 201-07-24
PRIOR FILING DATE: 201-07-24
                                                                                                                                                                                                                                                                                                                                                                                                                         g
                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     유 정
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ď,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            D,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         8 B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           유
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        SA B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       85 B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                                                                                         2138
                                                                                                                                                                                                                                                                                                                                                                                                                                                               2161
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        2078
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                2101
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         2018
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1958
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1981
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1898
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1921
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1840
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1861
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1780
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1801
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1741
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1672
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1681
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1612
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1621
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1552
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1492
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 2041
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1561
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1432
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1441
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1501
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1372
                                                                                                                                                                                                                                                                                                                                                                                                                                           ACGTCCTCGTCAAGATGCTCGCNTAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                TGACGATCGGCACCAACGTCTCCCGCATCTACGAGGCCATCAAGNNCGGCNGCATCAACC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      TCCGCGAGGAGCTCGGCGTCAAGGCCCGCCGCGGCGACGTCTTCCTCGGCAAGCAGGAGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CGTCGTCGTCGCCCGCGCTCNCGTACCTCTCGCCGCGCGCACGCGCGCTCCTGTACTCGTTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CCGCCGAGAAAGGCCATCTCGCTCACGCGCCNANGTCCGCGGACNCCTTCTGGNCGGCNCCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     NNGTCCTCGCCNNNNGCCANNAGGTCTCGCTCGCNGCCGTCAACGCCTGGAAGGTCGCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      CTCGAGCCGCGCTGGCACGACGCCTTCTCGTTCGCGACCGGCACCGTCGTCGAGNNNNNN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   CTCGNGGACAAGGTCAACAAGNCGCTCNACAAGCGNCTCGAGCAGACCAACTCGTACGAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CAGGCCGTCGACCTCCGCGCGATGGAGTTCGAGTTCAAGAAGCAGTTCGACCCGNTNNTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        GCCGCNGCNGCNTACACTTCGGAGCTCGGNCACCTTGCCAACCCGGTNACGACCCACGTC
                                                                                                                                                                                                                                                                                                                                                                                                                         ACGTCCTCGTCAAGATGCTCGCDTAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           TGACGATCGGCACCAACGTCTCCCGCATCTACGAGGCCATCAAGDVCGGCHGCATCAACC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            TCCGCGAGGAGCTCGGCGTCAAGGCCCGCCGCGGCGACGTCTTCCTCGGCAAGCAGGAGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CONCORCOCCOCCOCCOCONACCTCTCCCCCCCCCACGCCCCTCCTACTCGTTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CCGCCGAGAAGGCCATCTCGCTCACGCGCBAVGTCCGCGACHCCTTCTGGBCGGCBCCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             TCGTCCTCGCCBYCTGCCA--AGGTCTCGCTCGCBGCCGTCAACGCCTGGAAGGTCGCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CTCGAGCCGCGCTGGCACGACGCCTTCTCGTTCGCGACCGGCACCGTCGTCGAGCTCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               CTCGHGGACAAGGTCAACAAGDCGCTCDACAAGCGBCTCGAGCAGACCAACTCGTACGAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                VCBDCGCTCHTCVAGCAGCACTTTGGCDCYGCCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               CAGGCCGTCGACCTCCGCGCGATGGAGTTCGAGTTCAAGAAGCAGTTCGACCCGVTBVTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              ACBGCCGAGGCCAACGACGTCCTTTCTCTCCTCCTCGCCACCCCACCTCTACTGCGTBCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             CAGCCGGCHGAGATGGGCAACCAGGCCGTCAACTCGCTCGCBCTCATCTCGGCBCGCCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CAGCCGGCNGAGATGGGCAACCAGGCCGTCAACTCGCTCGCNCTCATCTCGGCNCGCCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GCCGCBGCBGCBTACACTTCGGAGCTCGGHCACCTTGCCAACCCCGGTBACGACCCCACGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 CCBTCCTGCCTCGCCGAGGACCCBTCGCTCTCCTATCACTGCAAGGGCCTCGACATT
                                                                                                                                                                                                                                                                                                                                                                                                                                                               2186
                                                                                                                                                                                                                                                                                                                                                                                                                         2163
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                -----WACGAA
                                                                                                                                                                                              and
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1957
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1980
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1920
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1860
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1800
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1719
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1740
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1671
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1680
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1620
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1551
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           2137
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                2160
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            2077
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 2100
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           2017
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  2040
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1897
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1779
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1611
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1560
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1491
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1500
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1431
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1839
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         ; SOFTWARE: PatentIn Ver.
; SEQ ID NO 18
; LENGTH: 2439
; TYPE: DNA
; ORGANISM: Rhodotorula t
; FEATURE:
; NAMEKKEY: CDS
; LOCATION: (1)..(2148)
US-09-939-408A-18
                                         Š
                                                                                         밁
                                                                                                                    Š
                                                                                                                                                                      Дb
                                                                                                                                                                                                       δ
                                                                                                                                                                                                                                            В
                                                                                                                                                                                                                                                                                      Š
                                                                                                                                                                                                                                                                                                                                        망
                                                                                                                                                                                                                                                                                                                                                                     Ś
                                                                                                                                                                                                                                                                                                                                                                                                                       В
                                                                                                                                                                                                                                                                                                                                                                                                                                                      8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        맑
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ş
        Вþ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             문
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Query Match
Best Local Similarity
Matches 1913; Conserv
             817
                                                  841
                                                                                                                                                                        697
                                                                                                                                                                                                                                                         637
                                                                                                                                                                                                                                                                                               661
                                                                                                                                                                                                                                                                                                                                           577
                                                                                                                                                                                                                                                                                                                                                                                601
                                                                                                                                                                                                                                                                                                                                                                                                                         517
                                                                                                                                                                                                                                                                                                                                                                                                                                                                 541
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           457
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  481
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         397
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 421
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           337
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              277
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               218
                                                                                         757
                                                                                                                                 781
                                                                                                                                                                                                                721
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              161
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             101
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Ъ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       \vdash
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ATGGCCCCTCCNTCGACTCGATCGCGACCTCGNTCGCCAACGGCNTCNCNAACGGNTNG
                                     GCCGTCTCCGCCTCGATGGCGACCCTCGCTCTGCACGACGCACACATGCTCTCCTC
                                                                                                                                                                                            GTNCACGINNTNCACGAGGGCANNGAGAAGATCATGTNCGCCCGCGAGGGGATCGCGCTC
                                                                                                                                                                                                                                                                                  GGCGACCTCTCCCCCCCTCTCNTACATCGCCGCCGCCATCACCGGTCACCCGGACNNCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                             GTCAACTCGCTCACNCGCGGCCACTCGGCNGTCCGCCTCGTCGTCGTCGAGGCGCTCACC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              ACGACTGGTTTCGGCGGCTCGGCCGACACCCGGGACTGAGGATGCNATCTCGCTCCAGAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               ACCCCACCGNNACGNACGNNNTCGAACTCGACGGGTACACCCTCACCCTCGGNGACGTCG
          GCCGTCTCAGCATCGATGGCCACCCTCGCTCTGCACGACGCACACATGCTCTCGCTCCTC
                                                                                                                            TINGGICTCGAGCCCGTCGTCGTCGGCCCGAAGGAGGGTCTCGGTCTCAACGGCACG
                                                                                                                                                                                                                                                         ĠĠĊĠĂĊĊŦĊŦĊŦĊŦĊŦĊŦĊŦĊĊŦĂĊĂŦŦĠĊAĠĊĠĠĊĊĂŦĊAĠĊĠĠŦĊĂĊĊĊĠĠAĊAĠĊAĄĠ
                                                                                                                                                                                                                                                                                                                                           AACTTCCTCAACCACGGCATCACCCCCATCGTCCCCCCTCCGCGCCACCCATCTCTGCGTCG
                                                                                                                                                                                                                                                                                                                                                                AACTTCCTCAACCACGGCATCACCCCCATCGTCCCCCTCCGCGGGCACCATCTCGGCGTCG
                                                                                                                                                                                                                                                                                                                                                                                                                            ercaacaectreacecececcacreectrerececcreerectreacectecaececteaec
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             GGCCGCGGTCTCGAGAACTCGCTTCCCCTCGAGGTTGTTCGCGGCGCCATGACAATCCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   GGNCGCGGCCTCGAGAACTCGCTTCCGCTCGAGGTCGTCCGCCGCGCCCATGACCATCCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            ecrerecrice Acea ce ca cererece de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contracte de la contract
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    GCNCTCCTCGAGCACCAGCTCTGCGGGTGTNCTCCCNACGTCGNTCGANTCCTTCNGCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             AcGACTGGATTTGGCGGATCCGCAGACACCGCACGGAGGACGCCATCTCGCTCCAGAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   AAGATCGACAANAGNGTCGAGTTCCTCCGNNCNCAGCTCNACAACAGNGTCTACGGNGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              TCGGCGCCGCNCGCAAGGGCCGCNCNGTCCGGCGTCNCAGACAGNCGACAGNCGAGATCCGCGCA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CGCCGACCGACTCGA----CGCTCGAACTCGACGGCTACTCGCTCAACCTCGGAGACGTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               GCTCGCACCTGCCCACAACCCAGGTCACGCAGGTCGACATCGTCGAGAAGATGCTCGCCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                GCTCGCTCCTCCCGACCCAGCCCAGNNGACGCAGCTCGACATCGTNGAGNAGATCCTCGCCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   cacecennecenennuencenenacegececcacercercacnercusoresecence
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               ATGGCACCCTCGCTCGACTCGATCTCGCACTCGTTCGCAAACGGCGTCGCATCCGCAAAG
                                                                                            TTCAACCTCGAGCCCGTCGTCCTCGGCCCGAAGGAAGGTCTCGGTCTCGTCAACGGCACC
                                                                                                                                                                          GTGCACGTCGTCCACGAGGGCAAGGAGAAGATCCTGTACGCCCGCGAGGCGATGGCGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            AAGATTGACAAATCGGTCGAGTTCTTGCGCTCGCAACTCTCCATGAGCGTCTACGGCGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               TCTCGGCCGCGAGGAAGGGCAGGCCTGTCCGCGTCAAGGACAG-
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  68.7%;
79.4%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                toruloides
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              0;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Score 1699.4;
Pred. No. 0;
0; Mismatches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CAATGGCGCCTCGACCAACCTC----GCAGTCGCAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     - DB
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              459;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     9
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 - CGÁCGAGATCCGCTCA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        2439;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              36;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              336
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                100
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        120
             876
                                                      900
                                                                                              816
                                                                                                                                     840
                                                                                                                                                                          756
                                                                                                                                                                                                                    780
                                                                                                                                                                                                                                                            696
                                                                                                                                                                                                                                                                                                                                           636
                                                                                                                                                                                                                                                                                                                                                                                    660
                                                                                                                                                                                                                                                                                                                                                                                                                              576
                                                                                                                                                                                                                                                                                                                                                                                                                                                                   600
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            456
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           396
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 276
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              217
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 160
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      180
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         60
                                                                                                                                                                                                                                                                                                 720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              9
```

Ś

유 상 유 상

밁

멍

Ś 밁 Ś 밁 Ş 밁 Ś 망 Ś 맑 Š В Š 밁 Š В á В Š 밁 Ş B Ş B Ş B Ş 밁 Ş

```
Sequence 12, Application US/09939408A

Patent No. US20020102712A1

GENERAL INFORMATION:
APPLICANT: Yoshida, Roberta
APPLICANT: Yoshida, Roberta
APPLICANT: Yoshida, Anna
TITLE OF INVENTION: Phenylalanine Ammonia Lyase Polypeptide and
TITLE OF INVENTION: Using Same
FILE REFERENCE: 29479/50NSCA
CURRENT APPLICATION NUMBER: US/09/939,408A
CURRENT APPLICATION NUMBER: US/09/634,693
PRIOR APPLICATION NUMBER: D001-08-24
PRIOR APPLICATION NUMBER: PCT/US01/23270
PRIOR FILING DATE: 2001-07-24
PRIOR APPLICATION NUMBER: PCT/US01/23270
PRIOR APPLICATION NUMBER: PCT/US01/23270
                                                                                                                                                                                                                                                                                                                                                NUMBER OF SEQ ID NOS: 30
SOFTWARE: PatentIn Ver. 2.
SEQ ID NO 12
LENGTH: 2419
TYPE: DNA
                      Ş
                                                                                                                                       US-09-939-408A-12
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         RESULT 4
US-09-939-408A-12
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ş
                                                                                                                                                    NAME/KEY: CDS
LOCATION: (37)..(2196)
NAME/KEY: modified_base
LOCATION: (494)
OTHER INFORMATION: Other information: Y
NAME/KEY: unsure
LOCATION: (493)..(495)
OTHER INFORMATION: Other information: X
                                                            Best Local Sir
Matches 1878;
                                                                               Query Match
Best Local Similarity
                                                                                                                                                                                                                                                                                                              ORGANISM: Rhodotorula graminis FEATURE:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 2281
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          2221
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                2126
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   2161
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           2066
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    2006
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         2041
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1946
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1981
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        2365 CGCATAAA 2372
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  2341 NGTHNINCANNNACNCHTHNINNNNNANNCNGGNANNGANTINNANGNNTNCGNGNNCNNNNNN 2400
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   2186 TATCCCGCCTGCACTCTTAGGACTCGCTTCTTGTCGGACTCGGATCTCGCATCGCTTCTT 2245
1 ATGGCCCCTCCNTCGACTCGATCGCGACCTCGNTCGCCAACGGCNTCNCNAACGGNTNG 60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         NNNANAAA 2408
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               AGTACCCATCCACGCATCCGATAAATCAGGGAGAGATCTACGCTTGCGGGAGCTTCTTG 2364
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               TNNNNCNTNNCTCNCNNNNANCNNGTCNNTNNNNNCTNNNGNNTNNNNNNNCNNNC 2340
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        NNNCCNNNNNNNNCTNTTNGNNNTCGNNTCNTGNCNNNNNNCGGAMNTNNCNNCNNNNNNN 2280
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                ACGTCCTCCAAGATGCTCGCTTAGACACTCTTCCCACTCTCGCATCCCTTCCATACCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ACGTCCTCGTCAAGATGCTCGCNTAGNNNCNCNNNCNANNCTCGCNTNNNNNCCNNNCNC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              TGACGATCGGCACCAACGTCTCCCGCATCTACGAGGCCATCAAGNNCGGCNGCATCAACC 2160
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             TCCGCGAGGAGCTCGGCGTCAAGGCCCGCCGCGCGACGTCTTCCTCGGCAAGCAGGAGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               ceaccircercececicacinaccincineececececacineagaricariacecerrice
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CGTCGTCGTCGCCCGCGCTCNCGTACCTCTCGCCGCGCACGCGCGCGCCTCCTGTACTCGTTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       TGACGATCGGCTCGAACGTCTCCAAGATCTACGAGGCCATCAAGTCGGGCAGGATCAACA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Conservative
                                                                             65.8%;
                                                                                                                                                                                                                                                                                                                                                                                                             2.0
                                                        Score 1629; DB 9; Pred. No. 0; 1; Mismatches 504;
                                                                                                                                                          Xaa = Val or Ala
                                                                                                                                                                                                                y = t or c
                                                            504;
                                                                                                 Length 2419;
                                                            Indels
                                                            25;
                                                            Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   2220
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         2125
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       2100
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             2005
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          2304
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  2065
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  2040
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                2185
```

,	\$ \$ \$ \$ \$	Db Qy Db	Q	D Q D Q D Q Q	B & B & B & B & B
931 TOCAGGCTTGACGGCTCCACGGTGGAGGCATCGACGAGGCTCAGGCTCAGGCTCACGGCTCACGGCAGGCA	<b>4 4 4 4</b>	631 AACTTCTTGAACCACGCATCACGCCATCGTCCCCCTCCGCGGCTCCATCTCGCGGCTCG 690 661 GGCGACCTCTCCCCCCTCTACATCGCCGCCGCCATCACCCGGACCACCAGCACCAAG 720 691 GGCGACCTCACCCGCTCTCTACATCGCCGGCCGCCATCACCCGGACCACCAGG 750 691 GGCGACCTCAGCCCGCTCTACATCGCCGGCGCGATCACCCCGACCGTCAAG 750 721 GTICACGTINITNCACGAGGGCANIGAGAAGATCATGTINCGCCCGCGAGGCGATCCCCTACTCGCTC 780 1   1   1   1   1   1   1   1   1   1	81 11 71	301 AAGATCGACAANAGNGTCGAGTTCCTCCGNNCNCAGCTCNACAACAGNGTCTACGGNGTC 360	37 ATGGCCCCTTCCTTGGACTCGCTCGCCACCACGCTCGCCAACGGCTTTACCAACGGCTCG 96 61 CACGCCGNNCCGNCNNNGNCGNCNACGGGCGCACGTCCACNCTCNGNCGGCCGNCGCNG 120
\$ \$ \$ \$ \$ \$ \$	,	2	Q	90 V O V O V O V V O V V O V V V V V V V	5
TCCGCGAGGAGCTCGGCTCAAGGCCCGCCGGCGACGTCTTCCTCGGCAAGCAGGAGG TGCGCGAGGAGCTCGGCGTCAAGGCCGCCGGCGACGTCTTCCTCGGCAAGCAGGAGG TGCGCGAGGAGCTCGGCTCCAAGCCCGCGCCGCG	1861 NNGTCCTCGCCNNNNGCCANNAGGTCTCGCTCGCCGCTCAACGCCTGGAAGGTCGCCT 1920	708 CCGACTCTCCTCCAGCAGCACCACCACCACCACCACCACCACCACCACCAC	ACNGCCAAGACCAACGACGTCTTTCTCTCTCTCGCCACCACTCTACTGCGTNCTC 162	OR CCTTCGTGCCTCGCTGCCGAGGACCCGTCGCTCAACCAAC	1141 GGCCCGCTCGTCAGCGACATGATTCACGCCCACGCNGTCCTCTCGCTCGAGGCCGGNCAG 1200

```
CURRENT APPLICATION NUMBER: US/09/765,873A
CURRENT FILING DATE: 2001-01-19
PRIOR APPLICATION NUMBER: US 09/627,216
PRIOR FILING DATE: 2000-07-27
PRIOR APPLICATION NUMBER: US 60/147,719
PRIOR FILING DATE: 1999-08-06
NUMBER OF SEQ ID NOS: 38
SOFTWARE: Microsoft Office 97
SEQ ID NO 9
LENGTH: 2151
TYPE: DNA
ORGANISM: mutant from Rhodotorula glutinis
                                                                                                                                                                                                                                                                                                                           Ŗ,
                                                                                                                                                                                                                                                                                                                                                        Ś
                                                                                                                            뭉
                                                                                                                                                           Ş
                                                                                                                                                                                                                         $
                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                          Ş
                                                                                                                                                                                                                                                                                                                                                                                            망
                                                                                                                                                                                                                                                                                                                                                                                                                        S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          ; FEATURE:
; NAME/KEY: CDS
; LOCATION: (1)..(2151)
US-09-765-873A-9
뭉
                         5
                                                              밁
                                                                                       S
                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     문
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      US-09-765-873A-9
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Sequence 9, Application US/09765873A
PATENT NO. US20010053847A1
GENERAL INFORMATION:
APPLICANT: Tang, Xiao-Song
TITLE OF INVENTION: BIOPRODUCTION OF PARA-HYDROXYCINNAMIC
FILE REFERENCE: BC1009 US CIP
                                                                                                                                                                                                                                                                                                                                                                                                                                                        Query Match
Best Local Similarity 83.7
Matches 1829; Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      2412 AAAAAAA 2419
337
                             361
                                                                                              301
                                                                                                                               218
                                                                                                                                                                                             161
                                                                                                                                                                                                                                                             101
                                                                                                                                                              241
                                                                                                                                                                                                                            181
                                                                                                                                                                                                                                                                                            121
                                                                                                                                                                                                                                                                                                                           61
                                                                                                                                                                                                                                                                                                                                                           61
                                                                                                                                                                                                                                                                                                                                                                                                            ATGGCCCCCTCCNTCGACTCGATCGCGACCTCGNTCGCCAACGGCNTCNCNAACGGNTNG
ACGACTGGATTTGGCGGATCCGCAGACACCCGCACCGAGGACGCCATCTCGCTCCAGAAG
                           ACGACTGGTTTCGGCGGCTCGGCCGACACCCGGACTGAGGATGCNATCTCGCTCCAGAAG
                                                                                             AAGATCGACAANAGNGTCGAGTTCCTCCGNNCNCAGCTCNACAACAGNGTCTACGGNGTC
                                                                                                                                                TCGGCGCCGCNCGCAAGGGCCGCNCNGTCCGCGTCNCAGACAGNCGACGACGAGATCCGCGCA
                                                                                                                                                                                             CGCCGACCGACTCGA----CGCTCGAACTCGACGGCTACTCGCTCAACCTCGGAGACGTCG
                                                                                                                                                                                                                          ACCCCACCGNNACGNACGNNNTCGAACTCGACGGGTACACCCTCACCCTCGGNGACGTCG
                                                                                                                                                                                                                                                           GCTCGCACCTGCCCACAACCCAGGTCACGCAGGTCGACATCGTCGAGAAGATGCTCGCCG
                                                                                                                                                                                                                                                                                       GCTCGCTCCTCCGACCACCCAGNNGACGCAGCTCGACATCGTNGAGNAGATCCTCGCCG
                                                                                                                                                                                                                                                                                                                                                        CACGCCGNNCCGNCNNNGNCGNCNACGGCGCCACGTCCACNCTCNGNCGGCCGNCGCNG
                                                                                                                                                                                                                                                                                                                                                                                            ATGGCACCCTCGCTCGACTCGATCTCGCACTCGTTCGCAAACGGCGTCGCATCCGCAAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     NNNANAAA 2408
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GGTCGTCA-GTACACGTGTATAGAGCCTGGAATGGATTGCAAGTCTTCGAGTTCAAAAAA 2411
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    NGTINNICANNIACNCNTNINNNNANNCNGGNANNGANTNNANGNNTNCGNGNNCNNNNNN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ACCCCAAGACCAGCTTTTCGACGTCGTGTCGTGCCAAGAACGGACTTTCCTCCATACACA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             NNNCCNNNNNNNNCTNTTNGNNNTCGNNTCNTGNCNNNNNNCGGANNTNNCNNCNNNNNNN
                                                              AAGATTGACAAATCGGTCGAGTTCTTGCGCTCGCAACTCTCCATGAGCGTCTACGGCGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   TGTCGCCTTACTCTCGCCGTCATCACGTCTCTCAGTTCTTTCGTATCCCGCGTCTCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 THINNINCHTUNCTCHCHUNNANCHNGTCHNTHINNHNCTHNUGHHTHHHHHHHHHCHNNC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                          65.7%;
83.7%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                       ; Score 1626.4;
; Pred. No. 0;
0; Mismatches
                                                                                                                                                                                                                                                                                                                           CAATGGCGCCTCGACCAACCTC----GCAGTCGCAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        glutinis
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         DB
                                                                                                                                                                                                                                                                                                                                                                                                                                                          322;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         9
                                                                                                                                                                                                                                                                                                                                                                                                                                                          Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           2151
                                                                                                                                                                                                                                                                                                                                                                                                                                                          35
'
                                                                                                                                                                                                                                                                                                                                                                                                                                                          Gaps
                             420
                                                              336
                                                                                             360
                                                                                                                             276
                                                                                                                                                           300
                                                                                                                                                                                           217
                                                                                                                                                                                                                          240
                                                                                                                                                                                                                                                           160
                                                                                                                                                                                                                                                                                          180
                                                                                                                                                                                                                                                                                                                           100
                                                                                                                                                                                                                                                                                                                                                          120
                                                                                                                                                                                                                                                                                                                                                                                            60
                                                                                                                                                                                                                                                                                                                                                                                                                         60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    2400
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  2340
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 2292
                                                                                                       Ş
                                                                                                                                           밁
                                                                                                                                                                                                                                     2
                                                                                                                                                                                                                                                                                                    Ş
                                       Ó
                                                                           밁
                                                                                                                                                                     S
                                                                                                                                                                                                         B
                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                                        Ş
                                                                                                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                                                                                                      Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                        뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        맑
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            õ
                                            1441
                                                                             1357
                                                                                                          1381
                                                                                                                                             1297
                                                                                                                                                                                                           1237
                                                                                                                                                                                                                                          1261
                                                                                                                                                                                                                                                                         1177
                                                                                                                                                                                                                                                                                                          1201
                                                                                                                                                                                                                                                                                                                                          1117
                                                                                                                                                                                                                                                                                                                                                                           1141
                                                                                                                                                                                                                                                                                                                                                                                                          1057
                                                                                                                                                                                                                                                                                                                                                                                                                                           1081
                                                                                                                                                                          1321
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1021
                                                                                                                                                                                                                                                                                                                                                                                                                                                                          997
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         937
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       961
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         877
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      901
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       817
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      841
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       757
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    781
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     697
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    721
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     637
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    661
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    577
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  601
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  517
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   541
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    457
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 481
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  397
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 421
                                  GCCGCNGCNGCNTACACTTCGGAGCTCGGNCACCTTGCCAACCCGGTNACGACCCACGTC 1500
                                                                                                                                                                     GCCAACCTCAACTTCACGCAGCTCACCGAGATGCTCAACGCCGGCATGAACCGCGGCCTN
                                                                                                                                                                                                                                                                                                                                                             GGCCCGCTCGTCAGCGACATGATTCACGCCCACGCNGTCCTCTCGCTCGAGGCCGGNCAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CGCACGCTCCTCGAGGGCAGCNNGTTTGCCGTCCACCACGAGGAGGAGGAGGTCAAGGTCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 TCGCAGGCGCTCACGGCTCTNACGGTCGAGGCCATGGTCGGCCACGCCGGCTCCTTCCAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        GCCGTCTCCGCCTCGATGCCACCCTCGCACGCACGCACACATGCTCTCCTCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      GGCGACCTCTCCCCCCTCTCNTACATCGCCGCCCATCACCGGTCACCCGGACNNCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GCNCTCCTCGAGCACCAGCTCTGCGGTGTNCTCCCNACGTCGNTCGANTCCTTCNGCCTC
                                                                             CCCTCCTGCCTCGCGGCCGAAGACCCCCTCGCTCCCTACCACTGCAAGGGCCTCGACATC
                                                                                                   CCNTCCTGCCTCGCTGCCGAGGACCCNTCGCTCTCTCTATCACTGCAAGGGGCCTCGACATT 1440
                                                                                                                                             GGCAAGCTCAACTTCACGCAGCTCACCGAGATGCTCAACGCCGGCATGAACCGCGGCCTC 1356
                                                                                                                                                                                                                                          TCGACGACCACCCCTCTCATCGACGTCGAGAACAAGACTTCGCACCACGGCGGCAAT
                                                                                                                                                                                                                                                                                                          TCGACGACCGACAACCCGCTCATCGACGTCGAGAACAAGANGACCCACCACGACGGCGGCAAC 1260
                                                                                                                                                                                                                                                                                                                                          GACGACGAGGGCATTCTCCGCCAGGACCGCTACCCCTTGCGCACGTCTCCTCAGTGGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                         GACGACGAGGCATTCTCCGCCAGGACCGCTACCCGCTCCGCACGTCGCCTCAGTGGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CGCAAGCTCCTCGAGGGAAGCCGCTTTGCTGTCCACCATGAGGAGGAGGAGGTCAAGGTCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CCCTTCCTTCACGACGTCACGCGCCCTCACCCGACGCAGATCGAAGTCGCGGGAAACATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        TCGCAGTCGCTCACGGCCATGACGGTCGAAGCGATGGTCGGCCACGCCGGCTCGTTCCAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       GCCGTCTCAGCATCGATGGCCACCCTCGCTCTGCACGACGCACACATGCTCTCGCTCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     TTCAACCTCGAGCCCGTCGTCGTCGGCCCGAAGGAGGGTCTCGGTCTCGTCAACGGCACC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          TINGGTCTCGAGCCCGTCGTCCTCGGCCCGAAGGAGGGTCTCGGTCTCGTCAACGGCACG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GTGCACGTCGTCCACGAGGGCAAGGAGAAGATCCTGTACGCCCGCGAGGCGATGGCGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GINCACGINNINCACGAGGGCANNGAGAAGAICAIGINCGCCCGCGAGGCGAICGCGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GGCGACCTCTCTCTCTCCTACATTGCAGCGGCCATCAGCGGTCACCCGGACAGCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    AACTTCCTCAACCACGCATCACCCCCATCGTCCCCCTCCGGGCACCATCTCTGCGTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       AACTTCCTCAACCACGGCATCACCCCCATCGTCCCCCTCCGCGGCACCATCTCGGCGTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    GTCAACAGCTTGACCCGCGCCACTCGGCTGTCCGCCTCGTCCTCGAGGCGCTCACC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            GTCAACTCGCTCACNCGCGGCCACTCGGCNGTCCGCCTCGTCGTCGTCGTCGAGGCGCTCACC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    GGCCGCGGTCTCGAGAACTCGCTTCCCCTCGAGGTTGTTCGCGGCGCCCATGACAATCCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 egnoecegocorcaagaacorcecorceaegorcerocecegococareacoarceco
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GCTCTCCTCGAGCACCAGCTCTGCGGTGTTCTCCCTTCGTCGTTCGACTCGTTCCGCCTC
                                                                             1416
                                                                                                                                                                                                            1296
                                                                                                                                                                                                                                                                                                                                                                           1200
                                                                                                                                                                                                                                                                                                                                                                                                            1116
                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1056
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1080
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  516
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         966
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       936
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      960
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       876
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        900
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       816
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      840
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     756
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      780
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     696
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    636
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    576
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  456
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   660
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   600
```

Mon

σ

```
Sequence 23, Application US/10138970A
Publication No. US20030079255A1
GENERAL INFORMATION:
APPLICANT: Sariasiani, Sima
APPLICANT: Tang, Xiao-Song
APPLICANT: Tang, Xiao-Song
APPLICANT: Of, Wei Wei
FIFLE OF INVENTION: Methods for the Production of Tyrosine, Cinnamic Acid and:
TITLE OF INVENTION: hydroxycinnamic Acid
FILE REFERENCE: CL1777
CURRENT APPLICATION NUMBER: US/10/138,970A
CURRENT APPLICATION SONG
INVESER OF SEQ ID NOS: 24
SOFTWARE: Microsoft Office 97
SEQ ID NO 23
LENGTH: 2151
                                 ; TYPE: DNA
ORGANISM: artificial sequence
FEATURE:
OTHER INFORMATION: mutant froi
US-10-138-970A-23
                                                                                                                                                                                                                                                                                                                                                                                                         RESULT 6
US-10-138-970A-23
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          B 8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      g
d
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   멍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    d
d
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      B 8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         망
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ъ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              g
 Query Match
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     2126
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    2161
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          2066
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             2101
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    2006
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     2041
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1946
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1981
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1886
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1921
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1837
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1777
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1717
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1741
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1657
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1597
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1621
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1537
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1477
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1861
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1801
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1681
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1561
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1501
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         ACGTCCTCGTCAAGATGCTCGCNTAG 2186
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            TGACGATCGGCACCAACGTCTCCCGCATCTACGAGGCCATCAAGNNCGGCNGCATCAACC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    TCCGCGAGGAGCTCGACGCCTCAAGGCCCGCCGCCGCCGCCGCCGCCTCTTCCCTCGGCAAGCAGGAGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CGACCTCGTCGCGCGCTCTCGTACCTCTCGCCGCGCACTCAGATCCTCTACGCCTTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CGTCGTCGTCGCCGCGCTCNCGTACCTCTCGCCGCGCACGCGCGCGCGCTCCTGTACTCGTTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      CCGCCGAGAAGGCCATCTCGCTCACGCGCNANGTCCGCGACNCCTTCTGGNCGGCNCCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 NNGTCCTCGCCNNNNGCCANNAGGTCTCGCTCGCNGCCGTCAACGCCTGGAAGGTCGCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CTCGTCCCGCGCTGGCACGACGCCTTCTCCTTCGCCGCCGCCACCGTCGAGGTCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CTCGAGCCGCGCTGGCACGCCTTCTCGTTCGCGACCGGCACCGTCGTCGAGNNNNNN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CTCGNGGACAAGGTCAACAAGNCGCTCNACAAGCGNCTCGAGCAGACCAACTCGTACGAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   GTCTCGCTCATCGACCAGCACTTTGGCTCCGCCATGACCGGCTCGAACCTGCGCGACGAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CAAGCCATCGACTTGCGCGCGACCGAGTTCGAGTTCAAGAAGCAGTTCGGCCCAGCCATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 CAGGCCGTCGACCTCCGCGCGATGGAGTTCGAGTTCAAGAAGCAGTTCGACCCGNTNNTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     ACGTCCTCCAAGATGCTCGCTTAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   CCGCCGAGTCGGCCATCTCGCTCACCCGCCAAGTCCGCGAGACCTTCTGGTCCGCCGCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         TCGTCGACGTC-----GCTCTCGCTCGCCGCCGTCAACGCCTGGAAGGTCGCCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CTCGTCGAGAAGGTGAACAAGACGCTCGCCAAGCGCCTCGAGCAGACCAACTCGTACGAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   TGACGATCGGCTCGAACGTCTCCAAGATCTACGAGGCCATCAAGTCGGGCAGGATCAACA
                                                      mutant from
 65.7%;
 Score
                                                      Rhodotorula glutinis
 1626.4;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     2151
 DB
 15;
 Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1800
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1980
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1836
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1776
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              2125
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               2160
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     2100
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          2005
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              2040
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1945
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1885
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1920
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1860
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1656
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1680
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1596
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1620
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1536
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    2065
                                                                                                                                                                                                                                                                                and
                                                                                                                                                                                                                                                                                Para-
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Š
                 Ş
                                                        B
                                                                                S
                                                                                                                     Д
                                                                                                                                                      성 유
                                                                                                                                                                                                                               S
                                                                                                                                                                                                                                                                        g
                                                                                                                                                                                                                                                                                                     8
                                                                                                                                                                                                                                                                                                                                                  망
                                                                                                                                                                                                                                                                                                                                                                                 Ş
                                                                                                                                                                                                                                                                                                                                                                                                                            밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 뫄
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Best Local Similarity 83. 
Matches 1829; Conservative
                       1021
                                                          937
                                                                                                                                 877
                                                                                                                                                                    901
                                                                                                                                                                                                         817
                                                                                                                                                                                                                                                                                                                                                        697
                                                                                                                                                                                                                                                                                                                                                                                                                              637
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         577
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          601
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               517
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  541
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      457
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         481
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              397
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     337
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             277
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              161
                                                                                           961
                                                                                                                                                                                                                                          841
                                                                                                                                                                                                                                                                                757
                                                                                                                                                                                                                                                                                                                     781
                                                                                                                                                                                                                                                                                                                                                                                           721
                                                                                                                                                                                                                                                                                                                                                                                                                                                                  661
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               421
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   218
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      101
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ۲
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        μ
CGCACGCTCCTCGAGGGCAGCNNGTTTGCCGTCCACCACGAGGAGGAGGTCAAGGTCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     ACCCCACCGNNACGNNACGNNNTCGAACTCGACGGGTACACCCTCACCCTCGGNGACGTCG
                                                                                                                                                            TCGCAGGCCCCACGGCTCTNACGGTCGAGGCCATGGTCGGCCACGCCGGCTCGTTCCAC
                                                                                                                                                                                                                             GCCGTCTCCGCCTCGATGGCGACCCTCGCCTCTGCACGACGACACACATGCTCTCGCTCCTC
                                                                                                                                                                                                                                                                                                       TINGGTCTCGAGCCCGTCGTCCTCGGCCCGAAGGAGGGTCTCGGTCTCGTCAACGGCACG
                                                                                                                                                                                                                                                                                                                                                                             GTNCACGTNNTNCACGAGGGCANNGAGAAGATCATGTNCGCCCGCGAGGCGATCGCGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                        GGCGACCTCTCCCCCNTTACATCGCCGCCGCCATCACCGGTCACCCGGACNNCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            AACTTCCTCAACCACGCATCACCCCCATCGTCCCCCTCCGCGCACCATCTCGGCGTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GTCAACTCGCTCACNCGCGGCCACTCGGCNGTCCGCCTCGTCGTCCTCGAGGGGCTCACC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           GGNCGCGGCCTCGAGAACTCGCTTCCGCTCGAGGTCGTCGCCGCGCGCCCATGACCATCCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      GCNCTCCTCGAGCACCAGCTCTGCGGTGTNCTCCCNACGTCGNTCGANTCCTTCNGCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              ACGACTGGTTTCGGCGGCTCGGCCGACACCCCGGACTGAGGATGCNATCTCGCTCCAGAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                AAGATCGACAANAGNGTCGAGTTCCTCCGNNCNCAGCTCNACAACAGNGTCTACGGNGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             GCTCGCTCCTCCCGACCCACCCAGNNGACGCAGCTCGACATCGTNGAGNAGATCCTCGCCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             CAGGCTGT-----GCAGTCGCAGCCAACCTC-----GCAGTCGCAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CACGCCGNNCCGNCNNNGNCGNCNACGGGGGGCCACGTCCACNCTCNGNCGGCCGNCGCNG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                ATGGCCCCCTCCNTCGACTCGATCGCGACCTCGNTCGCCAACGGCNTCNCNAACGGNTNG
                                                                                                                             redeadredereacedecardacedredaadedaredredecadedecederedriceac
                                                                                                                                                                                                       GCCGTCTCAGCATCGACCACCCTCGCTCTGCACGACACACATGCTCTCGCTCCTC
                                                                                                                                                                                                                                                                                                                                                          ergeacercerceaceaegecaaegacaaearcereracecececeaegecaregeere
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       AACTTCCTCAACCACGGCATCACCCCCATCGTCCCCCTCCGCGGCACCATCTCTGCGTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             GTCAACAGCTTGACCCGCGGCCACTCGGCTTCGCGCCTCGTCGTCGAGGCGCTCACC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      GGCCGCGGTCTCGAGAACTCGCTTCCCCTCGAGGTTGTTCGCGGGCGCCATGACAATCCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              generecenceadeaceaecheriecedererrerecenterresacres recentedes de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta de la contracta 
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             AAGATTGACAAATCGGTCGAGTTCTTGCGCTCGCAACTCTCCATGAGCGTCTACGGCGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       TCTCGGCGCGAGGAAGGGCAGGCCTGTCCGCGTCAAGGACAG-
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CGCCGACCGACTCGA---CGCTCGAACTCGACGGCTACTCGCTCAACCTCGGAGACGTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      GCTCGCACCTGCCCACAACCCAGGTCACGCAGGTCGACATCGTCGAGAAGATGCTCGCCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ATGGCACCCTCGCTCGACTCGATCTCGCACTCGTTCGCAAACGGCGTCGCATCCGCAAAG
                                                                              TTCAACCTCGAGCCCGTCGTCCTCGGCCCCGAAGGGGGTCTCGGTCTCGTCAACGGCACC
                                                                                                                                                                                                                                                                                                                                                                                                                                GGCGACCTCTCTCTCTCTACATTGCAGCGGCCATCAGCGGTCACCCGGACAGCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     ACGACTGGATTTGGCCGCATCCGCAGACACCCGCACGGACGCCATCTCGCTCCAGAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             83.7%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Pred. No. 0;
0; Mismatches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             322;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         - CGACGAGATCCGCTCA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             35;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               100
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  120
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           180
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    600
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 336
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          160
                                                                                                                                     936
                                                                                                                                                                        960
                                                                                                                                                                                                             876
                                                                                                                                                                                                                                              900
                                                                                                                                                                                                                                                                                                                     840
                                                                                                                                                                                                                                                                                                                                                                                                                                696
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         636
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              660
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   576
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          516
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                456
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        396
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         276
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                217
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       60
                           1080
                                                              996
                                                                                                                                                                                                                                                                                   816
                                                                                                                                                                                                                                                                                                                                                          756
                                                                                                                                                                                                                                                                                                                                                                                             780
                                                                                                                                                                                                                                                                                                                                                                                                                                                                      720
```

Ś Ŗ, Š 뮍

В

CCTCGGCAAGCAAGI GNNCGGCNGCATCAI 	TÓCGCGAGGÁGCTTGGCGTCAAGGCCCGCCGCGGAGACGTCTT TGACGATCGGCACCAACGTCTCCCGCATCTACGAGGCCATCAA	2006 2101 2066
CCTCGGCAAGCAG	TCCGCGAGGAGCTCGGCGTCAAGGCCCGCCGGCGACGTCTT	4 6
CGTCTGTACTCGTTCG	CGTCGTCGTCGCCGCGCGCTCNCGTACCTCTCGCCGCGCACGCC	1981 1946
CTTCTGGNCGGCNCCGT	CCGCCGAGAAGGCCATCTCGCTCACGCGCNANGTCCGCGACNC	1921 1886
CGCCTGGAAGGTCGCCT	NNGTCCTCGCCNNNNGCCANNAGGTCTCGCTCGCNGCCGTCAA	1861 1837
ACCGTCGTCGAGNNNNNN            ACCGTCGTCGAGGTCCTC	CTCGAGCCGCGCTGGCACGACGCCTTCTCGTTCGCGACCGGC	1801
CAGACCAACTCGTACGAC	CTCGNGGACAAGGTCAACAAGNCGCTCNACAAGCGNCTCGAC	1741 1717
NNNNNNNNNNNACGAA      TCGAACCTGCGCGACGAG	NCNNCGCTCNTCNAGCAGCACTTTGGCNCNGCCCTCGACGGC	1681
AGTTCGACCCGNTNNTC	CAGGCCGICGACCICCGCGCGATGGAGTTCGAGTTCAAGAAG(	1621 1597
ACCTCTACTGCGTNCTC	. ACNGCCGAGGCCAACGACGTCCTTTCTCTCCTCCTCGCCACCCC	1561 1537
TCATCTCGGCNCGCCGC	CAGCCGGCNGAGATGGGCAACCAGGCCGTCAACTCGCTCGCNCT	1501 1477
CGGTNACGACCCACGTC 1	GCGGCNGCNGCNTACACTTCGGAGCTCGGNCACCTTGCCAACC	1441 1417
GCAAGGGCCTCGACATT	CONTOCTGCCTGCGTGCGAGGACCONTCGCTCTCCTATCACTG	1381 1357
GCATGAACCGCGGCCTN 1	GGCAAGCTCAACTTCACGCAGCTCACCGAGATGCTCAACGCCG	1321 1297
TCGCNCTCGCCCTGATC 1	TTCCAGGCGNCCGCTGTCGCNAACACGATGGAGAAGACTCGCC	1261 1237
CGCACCACGGCGGCAAC 1	TCGACGACGACCACCGCTCATCGACGTCGAGAACAAGANGA	1201
CGCTCGAGGCCGGNCAG 1	GGCCCGCTCGTCAGCGACATGATTCACGCCCACGCNGTCCTCT	1141 1117
CGTCGCCTCAGTGGCTC 1	. GACGACGAGGCATTCTCCGCCAGGACCGCTACCCGCTCCGCAC	1081
AGGAGGTCAAGGTCAAG	CGCAAGCTCCTCGAGGGAAGCCGCTTTGCTGTCCACCATGAGGAGGAGG	997

Š

멍

Ş

밁

S

Ş 8 Ś

5

В

Ş 밁 8 B Ş 맔 Ş B Š

```
LENGTH: 2151

TYPE: DNA

ORGANISM: Rhodotorula glutinis mutant
FEATURE:
NAME/KEY: CDS
LOCATION: (1)..(2151)
OTHER INFORMATION:
US-10-188-523B-9
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            문
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           망
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   RESULT 7
US-10-188-523B-9
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     á
   S
                                                                               뮍
                                                                                                                                                  S
                                                                                                                                                                                                                                 멼
                                                                                                                                                                                                                                                                                         8
                                                                                                                                                                                                                                                                                                                                                                                    뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                   Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Sequence 9, Application US/10188523B Publication No. US20030170834A1 GENERAL INFORMATION:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Query Match 65.7%;
Best Local Similarity 83.7%;
Matches 1829; Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 SEQ ID NO 9
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 APPLICANT: Tang, Xiao-Song
TITLE OF INVENTION: BIOPRODUCTION OF PARA-HYDROXYCINNAMIC ACID
FILE REFERENCE: BC1009 US DIVCIP
CURRENT APPLICATION NUMBER: US/10/188,523B
CURRENT FILING DATE: 2002-10-17
PRIOR APPLICATION NUMBER: US 9/627,216
PRIOR FILING DATE: 2000-07-27
PRIOR FILING DATE: 2000-07-27
PRIOR APPLICATION NUMBER: US 60/147,719
PRIOR PILING DATE: 1999-08-06
NUMBER OF SEQ ID NOS: 38
SOFTWARE: Microsoft Office 97
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          2126 ACGTCCTCCAAGATGCTCGCTTAG 2151
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             2161
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     121
541 GTCAACTCGCTCACNCGCGGCCACTCGGCNGTCCGCCTCGTCGTCCTCGAGGCGCTCACC 600
                                                                                   457
                                                                                                                                                      481
                                                                                                                                                                                                                                         397
                                                                                                                                                                                                                                                                                                            421
                                                                                                                                                                                                                                                                                                                                                                                        337
                                                                                                                                                                                                                                                                                                                                                                                                                                                               361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          277
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             218
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           161
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   181 ACCCCACCGNNACGNACGNNNTCGAACTCGACGGGTACACCCTCACCCTCGGNGACGTCG 240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          101
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      μ
                                                                                                                              GGNCGCGGCCTCGAGAACTCGCTTCCGCTCGAGGTCGTCCGCGGCGCCATGACCATCCGC 540
                                                                                                                                                                                                                                                                                                 GCNCTCCTCGAGCACCAGCTCTGCGGTGTNCTCCCNACGTCGNTCGANTCCTTCNGCCTC 480
                                                                                                                                                                                                                                                                                                                                                                                                                                       ACGACTGGTTTCGGCGGCTCGGCCGACACCCGGACTGAGGATGCNATCTCGCTCCAGAAG 420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        TCGGCGCCGCNCGCAAGGGCCGCNCNGTCCGCGTCNCAGACAGNCGACGACGAGATCCGCGCA 300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GCTCGCTCCCCGACCCAGCCAGNNGACGCAGCTCGACATCGTNGAGNAGATCCTCGCCG 180
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CAGGCTGT-----GCAGTCGCACCTCGACCTC----GCAGTCGCAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CACGCCGNNCCGNCNNNGNCGNCNACGGGCGCCACGTCCACNCTCNGNCGGCCGNCGCNG 120
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              ATGGCCCCTCCNTCGACTCGATCGCGACCTCGNTCGCCAACGGCNTCNCNAACGGNTNG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ACGTCCTCGTCAAGATGCTCGCNTAG 2186
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          AAGATTGACAAATCGGTCGAGTTCTTGCGCTCGCAACTCTCCATGAGCGTCTACGGCGTC 336
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      AAGATCGACAANAGNGTCGAGTTCCTCCGNNCNCAGCTCNACAACAGNGTCTACGGNGTC 360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             TETEGGECEGEGAGGAAGGECAGGECTETECGEGTEAAGGAEAG-CGACGAGATECGETEA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CGCCGACCGACTCGA----CGCTCGAACTCGACGCCTACTCGCTCAACCTCGGAGACGTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          GCTCGCACCTGCCCACAACCCAGGTCACGGCAGGTCGACATCGTCGAGAAGATGCTCGCCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ATGGCACCCTCGCTCGACTCGATCTCGCACTCGCAAACGGCGTCGCATCCGCAAAG
                                                                               GGCGCGGTCTCGAGAACTCGCTTCCCCTCGAGGTTGTTCGCGGCGCCATGACAATCCGC 516
                                                                                                                                                                                                                                     ecrerecidade a central de des contrates de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate del la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate del la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la contrate de la con
                                                                                                                                                                                                                                                                                                                                                                                    ACGACTGGATTTGGCGGATCCGCAGACACCCGCACCGAGGACGCCATCTCGCTCCAGAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Score 1626.4; DB 15; Length 2151; Pred. No. 0; O; Mismatches 322; Indels 35; Gaps
                                                                                                                                                                                                                                             456
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    100
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 276
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               217
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      160
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       60
                                                                                                                                                                                                                                                                                                                                                                                            396
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  60
```

1885

1945

2100

2005

1776

```
1621
                                                                                      1561
                                                                                                                          1477
                                                                                                                                                              1501
                                                                                                                                                                                                1417
                                                                                                                                                                                                                                    1441
                                                                                                                                                                                                                                                                     1357
                                                                                                                                                                                                                                                                                                       1381
                                                                                                                                                                                                                                                                                                                                           1297
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1177
                                                                                                                                                                                                                                                                                                                                                                           1321
                                                                                                                                                                                                                                                                                                                                                                                                             1237
                                                                                                                                                                                                                                                                                                                                                                                                                                                 1261
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1117
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1141
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1201
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1057
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1081
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1021
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    997
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        937
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            961
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               877
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                901
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   817
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     841
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         757
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             781
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               697
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 721
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    637
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     661
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        577
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          601
CAGGCCGTCGACCTCCGCGCGATGGAGTTCGAGTTCAAGAAGCAGTTCGACCCGNTNNTC
                                                                           CAGCCGGCNGAGATGGGCAACCAGGCCGTCAACTCGCTCGCNCTCATCTCGGCNCGCCGC
                                                                                                                                                                                                GCCGCTGCGGCGTACACCTCGGAGTTGGGACACCTCGCCAACCCTGTGACGACGCATGTC
                                                                                                                                                                                                                   GCCGCNGCNGCNTACACTTCGGAGCTCGGNCACCTTGCCAACCCGGTNACGACCCACGTC
                                                                                                                                                                                                                                                                                                                                                                  GGCAAGCTCAACTTCACGCAGCTCACCGAGATGCTCAACGCCGGCATGAACCGCGGCCTN 1380
                                                                                                                                                                                                                                                                                                                                                                                                                                    GCCCCCCTCGTCAGCGACATGATTCACGCCCACGCNGTCCTCTCGCTCGAGGCCGGNCAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   GACGACGAGGGCATTCTCCGCCAGGACCGCTACCCCGCTCCGCACGTCGCCTCAGTGGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CGCACGCTCCTCGAGGCAGCNNGTTTGCCGTCCACCACGAGGAGGAGGAGGTCAAGGTCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                TCGCAGGCGCTCACGGCTCTNACGGTCGAGGCCATGGTCGGCCACGCCGGCTCGTTCCAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        GGCGACCTCTCCCCCCCTCTCTACATCGCCGCCGCCATCACCGGTCACCCGGACNNCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           AACTTCCTCAACCACGGCATCACCCCCATCGTCCCCCTCCGGCGCACCATCTCGGCGTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            GTCAACAGCTTGACCCGCGGCCACTCGGCTGTCGCCTCGTCGTCCTCGAGGGGCTCACC
                                                    CAGCCGGCTGAGATGGCGAACCAGGCGGTCAACTCGCTTGCGCTCATCTCGGCTCGTCGC
                                                                                                                                                                                                                                                                     CCCTCCTGCCTCGCGGCCGAAGACCCCTCGCTCTCCTACCACTGCAAGGGCCTCGACATC
                                                                                                                                                                                                                                                                                                     CONTCCTGCCTCGCTGCCGAGGACCCNTCGCTCCTATCACTGCAAGGGCCTCGACATT 1440
                                                                                                                                                                                                                                                                                                                                           GGCAAGCTCAACTTCACGCAGCTCACCGAGATGCTCAACGCCGGCATGAACCGCGGCCTC
                                                                                                                                                                                                                                                                                                                                                                                                               TTCCAGGCTGCCGCTGTGGCCAACACCATGGAGAAGACTCGCCTCGGGCTCGCCCAGATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GACGACGAGGGCATTCTCCGCCAGGACCGCTACCCCTTGCGCACGTCTCCTCAGTGGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CCCTTCCTTCACGACGTCACGCGCCCTCACCCGACGCAGATCGAAGTCGCGGGAAACATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CCNTTCCTCCACGACGTCACGCGCCCTCACCCGACCCAGATCGAGGTCGCGCGCAACATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          redeadrederealedecardacedredaadedaredredecaedecedecredreeae
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              TINGGTCTCGAGCCCGTCGTCCTCGGCCCGAAGGAGGGTCTCGGTCTCGTCAACGGCACG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               GTGCACGTCGTCCACGAGGGCAAGGAGAAGATCCTGTACGCCCGCGAGGCGATGGCGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             GTNCACGTNNTNCACGAGGGCANNGAGAAGATCATGTNCGCCCGCGAGGCGATCGCGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      AACTTCCTCAACCACGGCATCACCCCCATCGTCCCCCTCCGCGGCACCATCTCTGCGTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     TCGACGACCGACAACCCTCTCATCGACGTCGAGAACAAGACTTCGCACCACGGCGGCAAT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     TCGACGACCGACAACCCGCTCATCGACGTCGAGAACAAGANGACCCACCACGACGGCGAAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CGCAAGCTCCTCGAGGGAAGCCGCTTTGCTGTCCACCATGAGGAGGAGGTCAAGGTCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         TTCAACCTCGAGCCCGTCGTCCTCGGCCCGAAGGAGGGTCTCGGTCTCGTCAACGGCACC
                  1680
                                                    1596
                                                                                                                          1536
                                                                                                                                                            1560
                                                                                                                                                                                                1476
                                                                                                                                                                                                                                  1500
                                                                                                                                                                                                                                                                     1416
                                                                                                                                                                                                                                                                                                                                         1356
                                                                                                                                                                                                                                                                                                                                                                                                                                               1320
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1236
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1260
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1200
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1116
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1140
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1056
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1080
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1020
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                960
                                                                                                                                                                                                                                                                                                                                                                                                             1296
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1176
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        966
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              936
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   876
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     900
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       816
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             756
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             840
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   696
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      636
                                                                                                                                                                                                                                       APPLICANT: Milano, Joseph

APPLICANT: Milano, Joseph

TITLE OF INVENTION: METHOD FOR THE RECOMBINATION OF GEN

FILE REFERENCE; CL1794 US NA

CURRENT APPLICATION NUMBER: US/10/374,366

CURRENT FILING DATE: 2003-02-26

PRIOR APPLICATION NUMBER: 60/360,279

PRIOR FILING DATE: 2002-02-26

NUMBER OF SEQ ID NOS: 203

SOFTMARE: Patentin version 3.2

SEQ ID NO 3

LENGTH: 2151

TYPE: DNA

ORGANISM: Rhodosporidium glutinis

US-10-374-366-3
Ś
                                 ₽
                                                            á
                                                                                                       밁
                                                                                                                                   8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        RESULT 8
US-10-374-366-3
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 믕
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     문
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            뭕
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Sequence 3, Application US/10374366
Publication No. US20040014085A1
GENERAL INFORMATION:
                                                                                                                                                                             Query Match
Best Local Similarity
Matches 1829; Conserv
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     2101
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1946
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1981
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1777
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1801
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1717
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               2126
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               2161
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       2006
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           2041
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1886
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1921
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1837
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1861
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1597
 121
                                   61
                                                                   61
                                                                                                                                           Ь
 GCTCGCTCCCCGACCACCCAGNNGACGCAGCTCGACATCGTNGAGNAGATCCTCGCCG
                                                                   ATGGCACCCTCGCTCGACTCGATCTCGCACTCGTTCGCAAACGGCGTCGCATCCGCAAAG
                                                                                                                                         ATGGCCCCCTCCNTCGACTCGATCGCGACCTCGNTCGCCAACGGCNTCNCNAACGGNTNG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               ACGICCICCAAGAIGCICGCIIAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    ACGTCCTCGTCAAGATGCTCGCNTAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     TGACGATCGGCACCAACGTCTCCCGGCATCTACGAGGCCATCAAGNNCGGCNGCATCAACC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            TCCGCGAGGAGCTCGGCGTCAAGGCCCGCCGCCGGCGAGCGTCTTCCTCGGCAAGCAGGAGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 CCGCCGAGAAGGCCATCTCGCTCACGCGCWANGTCCGCGACNCCCTTCTGGNCGGCNCCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        NNGTCCTCGCCNNNNGCCANNAGGTCTCGCTCGCNGCCGTCAACGCCTGGAAGGTCGCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      CTCGNGGACAAGGTCAACAAGNCGCTCNACAAGCGNCTCGAGCAGACCAACTCGTACGAC 1800
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   TGACGATCGGCTCGAACGTCTCCAAGATCTACGAGGCCATCAAGTCGGGCAGGATCAACA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               CGACCTCGTCGCCCGCGCTCTCGTACCTCTCGCCGCGCACTCAGATCCTCTACGCCTTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                cercercercececronceraccrorececececacecercroratacroerroe
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CCGCCGAGTCGGCCATCTCGCTCACCCGCCAAGTCCGCGAGACCTTCTGGTCCGCCGCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          TCGTCGACGTC-
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                crceaeccecereceacecrrcrcerreceaeceecaceercerceaeunnunu
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CTCGTCGAGAAGGTGAACAAGACGCTCGCCAAGCGCCTCGAGCAGACCAACTCGTACGAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       GTCTCGCTCATCGACCAGCACTTTGGCTCCGCCATGACCGGCTCGAACCTGCGCGACGAG 1716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CAAGCCATCGACTTGCGCGCGACCGAGTTCGAGTTCAAGAAGCAGTTCGGCCCAGCCATC 1656
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CTCGTCCCGCGCTGGCACGACGCCTTCTCCCTTCGCCGGCCACCGTCGTCGAGGTCCTC 1836
                                                                                                                                                                               Conservative
                                                                                                                                                                                            65.7%;
                                                                                                                                                                           ; Score 1626.4; 
; Pred. No. 0; 
0; Mismatches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          -GCTCTCGCTCGCCGCCGTCAACGCCTGGAAGGTCGCCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               2151
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 2186
                                                                                                                                                                               322; Indels
                                                                                                                                                                                                               DB
                                                                                                                                                                                                                 16;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                    GENETIC ELEMENTS
                                                                                                                                                                                                             Length
```

Дb Š Вb 5 Дb 8 В Ş В

ω 5

120

0 9 9

100

Дb Ś В 8 멍 Ş B Ş 밁 Ś В Ś 멍 Ś В 8 B Š 멍 Ş Ď. δ 멍 8

Ś

- '	ນ :	##/ @@@@@@#@###########################	
<b>J</b>	1200	1141 GGCCCGCTCGTCAGCGACATGATTCACGCCCACGCNGTCCTCTCGCTCGAGGCCGGNCAG	-
	1140 1116	1081 GACGACGAGGCATTCTCCGCCAGGACGCTACCCGCTCGGCACGTCGCCTCAGTGGCTC	- 1
•	1080	1021 CGCACGCTCCTCGAGGGCAGCNNGTTTGCCGTCCACGAGGAGGAGGAGGTCAAGGTCAAG 	- 1
	1020 996	961 CCNTTCCTCCACGACGTCACGCGCCCTCACCCGACCCAGATCGAGGTCGCGCGCAACATC	
	960 936	901 TCGCAGGCGCTCACGGCTCTNACGGTCGAGGCCATGGTCGGCCACGGCCGGCTCGTTCCAC	
	900 876	841 GCGTCTCCGCCTCGATGGCGACCCTCGCTCTGCACGACGCACACATGCTCTCGCTCCTC	-
	840 816	781 TINGGTCTCGAGCCCGTCGTCCTCGGCCCGAAGGAGGGTCTCGGTCTCGTCAACGGCACG	
	780 756	721 GTNCACGTNNTNCACGAGGGCANNGAGAAGATCATGTNCGCCCGCGAGGCGATCGCGCTC	
	720 696	661 GGCGACCTCTCCCCCNCTCTCNTACATCGCCGCCGCCATCACCGGGTCACCCCGGACNNCAAG	
	660 636	601 AACTICCICAACCACGGCATCACCCCCATCGTCCCCCTCCGGCGGCACCATCTCGGCGTCG	
	600 576	541 GTCAACTCGCTCACNCGCGGCCACTCGGCNGTCCGCCTCGTCGTCCTCGAGGCGCTCACC	
	540 516	481 GENCGCGGCCTCGAGAACTCGCTTCCGCTGAGGTCGTCGGCGGGGGCCATGACCATCCGC	
	480 456	421 GCNCTCCTCGAGCACCAGCTCTGCGGTGTNCTCCCNACGTCGNTCGANTCCTTCNGCCTC	
	420 396	361 ACGACTGGTTTCGGCGGCCTCGGCCGACACCCGGACTGAGGATGCNATCTCGCTCCAGAAG	
	360 336	301 AAGATCGACAANAGNGTCGAGTTCCTCCGNNCNCAGCTCNACAACAGNGTCTACGGNGTC	
	300 276	241 TCGGCGCCGCNCGCAAGGGCCGCNCNGTCCGCGTCNCAGACAGNCGACGAGATCCGCGCA	
	240 217	181 ACCCCACCGNNACGNACGNANTCGAACTCGACGGTACACCCTCACCCTCGGNGACGTCG	
	160		

Ş 8 Ş B S 뮍 Ś 맑 Ś B Ş 멁 δÃ В Š ğ Š B S 밁 Ś B Ş 밁 á B

성 유 성 유

유정

유

1201

TCGACCGACCGACACCCGCTCATCGACGTCGAGAACAAGANGACCCACCACGACGGCGGAAC 1260

RESULT 9 US-10-374-366-9

2126

ACGTCCTCCTCAAGATGCTCGCTTAG

2151

Sequence 9, Application US/10374366
Publication No. US20040014085A1
GENERAL INFORMATION:
APPLICANT: Tang, Xiao-Song

```
덩
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          멍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         당
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            멍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          망
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
          Ş
                                                                                                              밁
                                                                                                                                                                                    δ
                                                                                                                                                                                                                                                                                        В
                                                                                                                                                                                                                                                                                                                                                                                       Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ď,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1477
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1177
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1297
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1321
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1237
                              2161
                                                                                                                             2066
                                                                                                                                                                                                             2101
                                                                                                                                                                                                                                                                                                                 2006
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1946
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1981
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1886
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1921
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1837
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1861
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1777
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1801
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1717
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1741
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1657
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1681
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1597
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1621
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1537
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1561
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1501
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1417
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1441
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1357
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1381
                                                                                                                                                                                                                                                                                                                                                                                                                2041
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   NNGTCCTCGCCNNNNGCCANNAGGTCTCGCTCGCNGCCGTCAACGCCTGGAAGGTCGCCT 1920
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        GTCTCGCTCATCGACCAGCACTTTGGCTCCGCCATGACCGGCTCGAACCTGCGCGACGAG 1716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               CAGGCCGTCGACCTCCGCGCGATGGAGTTCGAGTTCAAGAAGCAGTTCGACCCGNTNNTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      CAGCCGGCNGAGATGGGCAACCAGGCCGTCAACTCGCTCGCCTCATCTCGGCNCGCCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             eccecreceeceracaccreeeaerreeeacaccreeccaaccerereaceaecarere
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GCCGCNGCNTACACTTCGGAGCTCGGNCACCTTGCCAACCCGGTNACGACCCACGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 cecreerecereceded de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de la constant de l
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GGCAAGCTCAACTTCACGCAGCTCACCGAGATGCTCAACGCCGGCATGAACCGCGGGCCTN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    TCGACGACCGACAACCCTCTCATCGACGTCGAGAACAAGACTTCGCACCACGGCGGCAAT 1236
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CCGCCGAGAAGGCCATCTCGCTCACGCGCNANGTCCGCGACNCCTTCTGGNCGGCNCCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  TCGTCGACGTC-----
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CTCGNGGACAAGGTCAACAAGNCGCTCNACAAGCGNCTCGAGCAGACCAACTCGTACGAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     egenaderica a errea egenade errea egenada egene errea egenada egenada egene egenada errea egene errea egenada e
                                                                                                                                                                                                                                                                                                                                                                                  TCCGCGAGGAGCTCGGCGTCAAGGCCCCCCGCGACGTCTTCCTCCGCAAGCAGGAGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 CGTCGTCGTCGCCCGCGCTCNCGTACCTCTCGCCGCGCACGCGCGCTCCTGTACTCGTTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CCGCCGAGTCGGCCATCTCGCTCACCCGCCAAGTCCGCGAGACCTTCTGGTCCGCCGCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           checreceded de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la contract de la con
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CTCGAGCCGCGCTGGCACGACGCCTTCTCGTTCGCGACCGGCACCGTCGTCGAGNNNNNN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               credredada addresa de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de la composição de l
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CAAGCCATCGACTTGCGCGCGACCGAGTTCGAGTTCAAGAAGCAGTTCGGCCCAGCCATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               cadecedereadaredecedadecedreaderederredecrederedareredecederede
ACGTCCTCGTCAAGATGCTCGCNTAG
                                                                                                                                                                                                        TGACGATCGGCACCAACGTCTCCCGCATCTACGAGGCCATCAAGNNCGGCNGCATCAACC
                                                                                                                                                                                                                                                                                                                 CGACCTCGTCGCCGGCGCTCTCGTACCTCTCGCCGCGCACTCAGATCCTCTACGCCTTCG
                                                                                                                             TGACGATCGGCTCGAACGTCTCCAAGATCTACGAGGCCATCAAGTCGGGCAGGATCAACA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       - GCTCTCGCTCGCCGCCGTCAACGCCTGGAAGGTCGCCG 1885
                                   2186
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1380
                                                                                                                                            2125
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1945
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1980
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1860
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1776
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1800
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1680
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1536
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1560
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1476
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1500
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1416
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1296
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1320
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1656
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1596
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1620
                                                                                                                                                                                                                                      2160
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1836
                                                                                                                                                                                                                                                                                                                                2065
                                                                                                                                                                                                                                                                                                                                                                                                                               2100
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              2005
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   2040
```

```
; APPLICANT: Milano, Joseph; TITLE OF INVENTION: METHOD FOR THE RECOMBINA; FILE REFERENCE: CL1794 US NA; CURRENT APPLICATION NUMBER: US/10/374,366; CURRENT FILING DATE: 2003-02-26; PRIOR APPLICATION NUMBER: 60/360,279; PRIOR FILING DATE: 2002-02-26; NUMBER OF SEQ ID NOS: 203; SOFTWARE: Patentin version 3.2; SEQ ID NO.9
                                                                                       Š
                                                 Вb
                                                                                                                                 B
                                                                                                                                                             55 B 55 B
                                                                                                                                                                                                                                                                                                               20
                                                                                                                                                                                                                                                                                                                                                       유정
                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      뫄
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  뫄
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      g
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  ; TYPE: DNA
; ORGANISM: Rhodosporidium
US-10-374-366-9
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Query Match
Best Local
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Matches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        LENGTH: 2151
                                                                                           721
                                                           697
                                                                                                                                   637
                                                                                                                                                                       661
                                                                                                                                                                                                               577
                                                                                                                                                                                                                                                 601
                                                                                                                                                                                                                                                                                     517
                                                                                                                                                                                                                                                                                                                           541
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1828;
                       781
                                                                                                                                                                                                                                                                                                                                                                 457
                                                                                                                                                                                                                                                                                                                                                                                                     481
                                                                                                                                                                                                                                                                                                                                                                                                                                             397
                                                                                                                                                                                                                                                                                                                                                                                                                                                                               421
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     337
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               277
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       218
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 161
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            101
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Similarity
                                                                                   GTNCACGTNNTNCACGAGGGCANNGAGAAGATCATGTNCGCCCGCGAGGCGATCGCGCTC
TINGGTCTCGAGCCCGTCGTCCTCGGCCCGAAGGAGGGTCTCGGTCTCGGTCAACGGCACG
                                                         GTGCACGTCGTCCACGAGGCAAGGAGAAGATCCTGTACGCCCGCGAGGCGATGGCGCTC
                                                                                                                                 GGCGACCTCTCTCTCTCTACATTGCAGCGGCCATCAGCGGTCACCCGGACAGCAAG
                                                                                                                                                                     GGCGACCTCTCCCCNCTCTCNTACATCGCCGCCGCCATCACCGGTCACCCGGACNNCAAG
                                                                                                                                                                                                           AACTTCCTCAACCACGCATCACCCCCATCGTCCCCCTCCGCGCACCATCTCTGCGTCG
                                                                                                                                                                                                                                   AACTTCCTCAACCACGGCATCACCCCCATCGTCCCCCTCCGGGGCACCATCTCGGCGTCG
                                                                                                                                                                                                                                                                                   GTCAACAGCTTGACCCGGGGCCACTCGGCTGTCCGCCTCGTCGTCGTCGAGGCGCTCACC
                                                                                                                                                                                                                                                                                                           GTCAACTCGCTCACNCGCGGCCACTCGGCNGTCCGCCTCGTCGTCCTCGAGGCGCTCACC
                                                                                                                                                                                                                                                                                                                                                                                     GGNCGCGGCCTCGAGAACTCGCTTCCGCTCGAGGTCGTCCGCGGGGCGCATGACCATCCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                         GCTCTCCTCGAGCACCAGCTCTGCGGTGTTCTCCCTTCGTCGTTCGACTCGTTCCGCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                 GCNCTCCTCGAGCACCAGCTCTGCGGTGTNCTCCCNACGTCGNTCGANTCCTTCNGCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           ACGACTGGTTTCGGCGGCTCGGCCGACACCCCGGACTGAGGATGCNATCTCGCTCCAGAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 AAGATCGACAANAGNGTCGAGTTCCTCCGNNCNCAGCTCNACAACAGNGTCTACGGNGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               TCGGCGCCGCNCGCAAGGGCCCGCNCNGTCCCGCGTCNCAGACAAGNCGAGACAGACAGTCCGCGCA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ACCCCACCGNNACGNNNTCGAACTCGACGGGTACACCCTCACCCTCGGNGACGTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      GCTCGCTCCCGACCCACCCAGNNGACGCAGCTCGACATCGTNGAGNAGATCCTCGCCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    ATGGCCCCCTCCNTCGACTCGATCGCGACCTCGNTCGCCAACGGCNTCNCNAACGGNTNG
                                                                                                                                                                                                                                                                                                                                                                 GGCCGCGGTCTCGAGAACTCGCTTCCCCTCGAGGTTGTTCGCGGCGCCATGACAATCCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     ACGACTGGATTTGGCGGATCCGCAGACACCCGCACCGAGGACGCCATCTCGCTCCAGAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             AAGATTGACAAATCGGTCGAGTTCTTGCGCTCGCAACTCTCCATGAGCGTCTACGGCGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     TCTCGGCCGCGAGGAAGGGCAGGCCTGTCCGCGTCAAGGACAG-CGACGAGATCCGCTCA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 CGCCGACCGACTCGA---CGCTCGAACTCGACGCTACTCGCTCAACCTCGGAGACGTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        GCTCGCACCTGCCCACAACCCAGGTCACGCAGGTCGACATCGTCGAGAAGATGCTCGCCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CAGGCTGT----GCAGTCGCAGCCTCGACCAACCTC----GCAGTCGCAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CACGCCGNNCCGNCNNGNCGNCNACGGGCGCCACGTCCACNCTCNGNCGGCCGNCGCNG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            ATGGCACCCTCGCTCGACTCGATCTCGCACTCGTTCGCAAACGGCGTCGCATCCGCAAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        65.6%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  glutinis
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      0
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Score 1624.8;
Pred. No. 0;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            THE RECOMBINATION
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Mismatches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        323;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          16;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              ္ဌ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            GENETIC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            ELEMENTS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      35;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Gaps
                     840
                                                                                                                                   696
                                                                                                                                                                                                                                               660
                                                                                                                                                                                                                                                                                 576
                                                                                                                                                                                                                                                                                                                         600
                                                                                                                                                                                                                                                                                                                                                                                                                                       456
                                                                                                                                                                                                                                                                                                                                                                                                                                                                               480
                                                       756
                                                                                                                                                                     720
                                                                                                                                                                                                           636
                                                                                                                                                                                                                                                                                                                                                               516
                                                                                                                                                                                                                                                                                                                                                                                                 540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     396
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   276
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               217
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        160
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              180
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      120
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           336
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                100
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                60
   占
                         Ş
                                                                   밁
                                                                                                 δ
                                                                                                                                       40
                                                                                                                                                                             Ş
                                                                                                                                                                                                                           뮍
                                                                                                                                                                                                                                                     δÃ
                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                     8
                                                                                                                                                                                                                                                                                                                                                                                 뮍
                                                                                                                                                                                                                                                                                                                                                                                                           S
                                                                                                                                                                                                                                                                                                                                                                                                                                                         B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          g
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              문
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      뭐
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        당
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            뮍
                                                                           1777
                                                                                                                                                                                                                                                                                                                                                                                                                                                         1477
                                     1861
                                                                                                                                                   1717
                                                                                                                                                                                                                             1657
                                                                                                                                                                                                                                                                                                     1597
                                                                                                                                                                                                                                                                                                                                                                                 1537
                                                                                                                                                                                                                                                                                                                                                                                                                     1561
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1417
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1441
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1357
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1381
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1297
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1321
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1237
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1261
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1177
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1117
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1141
   1837
                                                                                                                                                                                                                                                               1681
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1501
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1201
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1057
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1021
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1081
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      997
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              937
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    961
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          877
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                901
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  817
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        841
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            757
                             NNGTCCTCGCCNNNNGCCANNAGGTCTCGCTCGCNGCCGTCAACGCCTGGAAGGTCGCCT
                                                                                             CTCGAGCCGCGCTGGCACGACGCCTTCTCGTTCGCGACCGGCACCGTCGTCGAGNNNNNN
                                                                                                                                                                       CTCGNGGACAAGGTCAACAAGNCGCTCNACAAGCGNCTCGAGCAGACCAACTCGTACGAC
   TCGTCGACGTC-
                                                                                                                                                   CTCGTCGAGAAGGTGAACAAGACGCTCGCCAAGCGCCTCGAGCAGACCAACTCGTACGAC
                                                                                                                                                                                                                             GTCTCGCTCATCGACCAGCACTTTGGCTCCGCCATGACCGGCTCGAACCTGCGCGACGAG
                                                                                                                                                                                                                                                         CAAGCCATCGACTTGCGCGCGACCGAGTTCGAGTTCAAGAAGCAGTTCGGCCCAGCCATC
                                                                                                                                                                                                                                                                                                                               CAGGCCGTCGACCTCCGCGCGATGGAGTTCGAGTTCAAGAAGCAGTTCGACCCGNTNNTC
                                                                                                                                                                                                                                                                                                                                                                                 CAGCCGGCNGAGATGGGCAACCAGGCCGTCAACTCGCTCGCNCTCATCTCGGCNCGCCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   GCCGCTGCGGCGTACACCTCGGAGTTGGGACACCTCGCCAACCCTGTGACGACGCATGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               GCCGCNGCNGCNTACACTTCGGAGCTCGGNCACCTTGCCAACCCGGTNACGACCCACGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CCNTCCTGCCTCGCTGCCGAGGACCCNTCGCTCTCCTATCACTGCAAGGGCCTCGACATT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GGCAAGCTCAACTTCACGCAGCTCACCGAGATGCTCAACGCCGGCATGAACCGCGGCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GGCAAGCTCAACTTCACGCAGCTCACCGAGATGCTCAACGCCGGCATGAACCGCGGCCTN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  TCGACGACCACCACCACCGCTCATCGACGTCGAGAACAAGANGACCCCACCACCACGGCGGCAAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          GGCCCGCTCGTCAGCGACATGATTCACGCCCACGCNGTCCTCTCGCTCGAGGCCGGNCAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        GACGACGAGGGCATTCTCCGCCAGGACCGCTACCCCTTGCGCACGTCTCCTCTGTGGGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        GACGAGGGGCATTCTCCGCCAGGAGGCTCCGCTACCCGCTCCGCACGTCGCCTCAGTGGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CGCACGCTCCTCGAGGGCAGCNNGTTTGCCGTCCACCACGAGGAGGAGGAGGTCAAGGTCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      CCNTTCCTCCACGACGTCACGCGCCCTCACCCGACCCAGATCGAGGTCGCGCGCAACATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            GCCGTCTCAGCATCGATGGCCACCCTCGCTCTGCACGACGCACACATGCTCTCGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           cccrecrecereses de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la concentración de la conce
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               TTCCAGGCTGCCGCTGTGGCCAACACCATGGAGAAGACTCGCCTCGGGCTCGCCCAGATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                TCGACGACCGACCCTCTCATCGACGTCGAGAACAAGACTTCGCACCACGGCGGCAAT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  TCGCAGGCCTCACGCTCTNACGGTCGAGGCCATGGTCGGCCACGCCCGGCTCGTTCCAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      CGCAAGCTCCTCGAGGGAAGCCGCTTTGCTGTCCACCATGAGGAGGAGGTCAAGGTCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CCCTTCCTTCACGACGTCACGCGCCCTCACCCGACGCAGATCGAAGTCGCGGGAAACATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        TCGCAGTCGCTCACGGCCATGACGGTCGAAGCGATGGTCGGCCACGCCGGCTCGTTCCAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      GCCGTCTCCGCTCGATGGCGACCCTCGCTCTGCACGACGCACACATGCTCTCGCTCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          TTCAACCTCGAGCCCGTCGTCCTCGGCCCGAAGGAGGGTCTCGGTCTCGTCAACGGCACC
                                                                         ACGACGCCTTCTCCTTCGCCGCCGCGCACCGTCGTCGAGGTCCTC
 GGAAGGTCGCCG
                                                                                                                                                                                                                           1716
                                                                                                                                                                                                                                                             1740
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1380
                                   1920
                                                                                                                                                   1776
                                                                                                                                                                                     1800
                                                                                                                                                                                                                                                                                                     1656
                                                                                                                                                                                                                                                                                                                                           1680
                                                                                                                                                                                                                                                                                                                                                                                 1596
                                                                                                                                                                                                                                                                                                                                                                                                                   1620
                                                                                                                                                                                                                                                                                                                                                                                                                                                         1536
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1560
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1476
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1500
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1416
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1440
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1356
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1296
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1320
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1140
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1056
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1080
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1260
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1176
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1200
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1116
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1020
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1236
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              996
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        936
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                876
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            960
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      900
```

```
APPLICANT: Tang, Xiao-Song
APPLICANT: Milano, Joseph
TITLE OF INVENTION: METHOD FOR THE RECOMBINATION OF
FILE REFERENCE: CL1794 US NA
CURRENT APPLICATION NUMBER: US/10/374,366
CURRENT FILING DATE: 2003-02-26
PRIOR APPLICATION NUMBER: 60/360,279
PRIOR FILING DATE: 2002-02-26
NUMBER: OF SEQ ID NOS: 203
SOSTWARE: Patentin version 3.2
LENGTH: 2151
                          ; LENGTH: 2151

; CROALISM: Rhodosporidium

; ORGANISM: Rhodosporidium

US-10-374-366-23
                                                                                                                                                                                           RESULT 11
US-10-374-366-23
                                                                                                                                                                                                                                                 8
                                                                                                                                                                                                                                                                                   Ş
                                                                                                                                                                                                                                                                        В
                                                                                                                                                                                                                                                                                                      В
                                                                                                                                                                                                                                                                                                                           Ş
                                                                                                                                                                                                                                                                                                                                                ğ
                                                                                                                                                                                                                                                                                                                                                              8
                                                                                                                                                                                                                                                                                                                                                                                     망
                                                                                                                                                                                                                                                                                                                                                                                                      Ş
                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                          Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                              유 성
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               DЪ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Ъ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            g
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Š
                                                                                                                                                                  Sequence 23, Application US/10374366 Publication No. US20040014085A1 GENERAL INFORMATION:
Query Match
Best Local
                                                                                                                                                                                                                                    2126
                                                                                                                                                                                                                                                     2161
                                                                                                                                                                                                                                                                                                                                                                                      1886
                                                                                                                                                                                                                                                                                                                                                                                                                                                               1777
                                                                                                                                                                                                                                                                         2066
                                                                                                                                                                                                                                                                                           2101
                                                                                                                                                                                                                                                                                                            2006
                                                                                                                                                                                                                                                                                                                               2041
                                                                                                                                                                                                                                                                                                                                                  1946
                                                                                                                                                                                                                                                                                                                                                                   1981
                                                                                                                                                                                                                                                                                                                                                                                                                           1837
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1717
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1477
                                                                                                                                                                                                                                                                                                                                                                                                        1921
                                                                                                                                                                                                                                                                                                                                                                                                                                            1861
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1801
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1741
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1657
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1597
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1537
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1681
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1621
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1561
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1501
Similarity
                                                                                                                                                                                                                                              ACGTCCTCGTCAAGATGCTCGCNTAG
                                                                                                                                                                                                                                                                                                                           TCCGCCAGGAGCTCGGCGTCAAGGCCCGCCGCGGCGACGTCTTCCTCGGCAAGCAGGAGG
                                                                                                                                                                                                                                                                                                                                                             CCGCCGAGAAGGCCATCTCGCTCACGCGCNANGTCCGCGACNCCTTCTGGNCGGCNCCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CTCGNGGACAAGGTCAACAAGNCGCTCNACAAGCGNCTCGAGCAGACCAACTCGTACGAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ACGTCCTCAAGATGCTCGCTTAG
                                                                                                                                                                                                                                                                        TGACGATCGGCTCGAACGTCTCCAAGATCTACGAGGCCATCAAGTCGGGCAGGATCAACA
                                                                                                                                                                                                                                                                                     TGACGATCGGCACCAACGTCTCCCGCATCTACGAGGCCATCAAGNNCGGCNGCATCAACC
                                                                                                                                                                                                                                                                                                                                                                                      CCGCCGAGTCGGCCATCTCGCTCACCCGCCAAGTCCGCGAGACCTTCTGGTCCGCCGCGT
                                                                                                                                                                                                                                                                                                                                                                                                                           TCGTCGACGTC:
                                                                                                                                                                                                                                                                                                                                                                                                                                          NNGTCCTCGCCNNNNGCCANNAGGTCTCGCTCGCNGCCGTCAACGCCTGGAAGGTCGCCT 1920
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CTCGAGCCGCGCTGGCACGACGCCTTCTCGTTCGCGACCGGCACCGTCGTCGAGNNNNNN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        GTCTCGCTCATCGACCAGCACTTTGGCTCCGCCATGACCGGCTCGAACCTGCGCGACGAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     ACGACCGAGTCCAACGACGTCCTTT
                                                                                                                                                                                                                                                                                                            CGACCTCGTCGCCCGCGCTCTCGTACCTCTCGCCGCGCACTCAGATCCTCTACGCCTTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                               CTCGTCCCGCGCTGGCACGACGCCTTCTCCTTCGCCGCCGCACCGTCGTCGACGTCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   CTCGTCGAGAAGGTGAACAAGACGCTCGCCAAGCGCCTCGAGCAGACCAACTCGTACGAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CAAGCCATCGACTTGCGCGCGACCGAGTTCGAGTTCAAGAAGCAGTTCGGCCCAGCCATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             CAGGCCGTCGACCTCCGCGCGATGGAGTTCGAGTTCAAGAAGCAGTTCGACCCGNTNNTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 65.6%;
                                   glutinis
Score 1624.8;
Pred. No. 0;
                                                                                                                                                                                                                                                                                                                                                                                                                          GCTCTCGCTCGCCGCCGTCAACGCCTGGAAGGTCGCCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CTCTCCTCGCCACCCACCTCTACTGCGTTCTC
                                                                                                                                                                                                                                   2151
                                                                                                                                                                                                                                                     2186
         DB
        16;
                                                                                                                                       OF GENETIC
       Length 2151;
                                                                                                                                       ELEMENTS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1680
                                                                                                                                                                                                                                                                        2125
                                                                                                                                                                                                                                                                                         2160
                                                                                                                                                                                                                                                                                                                              2100
                                                                                                                                                                                                                                                                                                                                                                                     1945
                                                                                                                                                                                                                                                                                                                                                                                                       1980
                                                                                                                                                                                                                                                                                                                                                                                                                          1885
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1860
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1800
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1716
                                                                                                                                                                                                                                                                                                            2065
                                                                                                                                                                                                                                                                                                                                                2005
                                                                                                                                                                                                                                                                                                                                                                  2040
                                                                                                                                                                                                                                                                                                                                                                                                                                                               1836
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1776
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1740
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1656
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1596
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1620
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1536
            .8
                                   В
                                                Š
                                                                       밁
                                                                                       Ş
                                                                                                                          Ś
                                                                                                                                                밁
                                                                                                                                                                                    밁
                                                                                                                                                                                                                                        Ş
                                                                                                           뮍
                                                                                                                                                                Ś
                                                                                                                                                                                                    Š
                                                                                                                                                                                                                         문
                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                              Ś
                                                                                                                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                                                                                   Ş
                                                                                                                                                                                                                                                                                                                                                       Š
                                                                                                                                                                                                                                                                                                                                       В
                                                                                                                                                                                                                                                                                                                                                                           B
                                                                                                                                                                                                                                                                                                                                                                                             Ş
                                                                                                                                                                                                                                                                                                                                                                                                              B
                                                                                                                                                                                                                                                                                                                                                                                                                                 Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        뮹
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Matches 1828;
                 1021
997
                                   937
                                                     961
                                                                       877
                                                                                         901
                                                                                                           817
                                                                                                                             841
                                                                                                                                                757
                                                                                                                                                                                     697
                                                                                                                                                                                                                         637
                                                                                                                                                                                                                                           661
                                                                                                                                                                                                                                                              577
                                                                                                                                                                                                                                                                                 601
                                                                                                                                                                                                                                                                                                   517
                                                                                                                                                                                                                                                                                                                     541
                                                                                                                                                                  781
                                                                                                                                                                                                      721
                                                                                                                                                                                                                                                                                                                                        457
                                                                                                                                                                                                                                                                                                                                                        481
                                                                                                                                                                                                                                                                                                                                                                            397
                                                                                                                                                                                                                                                                                                                                                                                             421
                                                                                                                                                                                                                                                                                                                                                                                                                337
                                                                                                                                                                                                                                                                                                                                                                                                                                  361
                                                                                                                                                                                                                                                                                                                                                                                                                                                    277
                                                                                                                                                                                                                                                                                                                                                                                                                                                                      301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         218
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              161
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   101
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Ь
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CAGGCTGT-
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Conservative
```

```
1 ATGGCCCCCTCCNTCGACTCGATCGCGACCTCGNTCGCCAACGGCNTCNCNAACGGNTNG
CGCACGCTCCTCGAGGGCAGCNNGTTTGCCGTCCACCACGAGGAGGAGGAGGTCAAGGTCAAG
                                                                                                                                                                                                                                                                                                                   GCCGTCTCCGCTCGATGGCGACCCTCGCTCTGCACGACGACGCACACATGCTCTCGCTCCTC
                                                                   CCCTTCCTTCACGACGTCACGCGCCCTCACCCGACGCAGATCGAAGTCGCGGGGAAACATC
                                                                                                     CONTTCCTCCACGACGTCACGCGCCCTCACCCCGACCCAGATCGAGGTCGCGCGCAACATC
                                                                                                                                                                                                                      rcecaeececroaceecromaceerceaeeccareerceaeccaeecceecroerrceac
                                                                                                                                                                                                                                                                            GCCGTCTCAGCATCGATGGCCACCCTCGCTCTGCACGACGCACACATGCTCTCGCTCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                      TINGGICICGAGCCCGTCGICCTCGGCCCGAAGGAGGGTCTCGGTCICGTCAACGGCACG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          GTGCACGTCGTCCACGAGGGCAAGGAGAAGATCCTGTACGCCCGCGAGGCGATGGCGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             GTNCACGTNNTNCACGAGGGCANNGAGAAGATCATGTNCGCCCGCGAGGCGATCGCGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                GGCGACCTCTCCCCCNCTCTCNTACATCGCCGCCGCCATCACCGGTCACCCGGACNNCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             AACTTCCTCAACCACGGCATCACCCCCCATCGTCCCCCTCCGGGGCACCATCTCGGCGTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GTCAACAGCTTGACCCGGGCCACTCGGCTGTCCGCCTCGTCCTCGAGGCGCTCACC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GTCAACTCGCTCACNCGCGGCCACTCGGCNGTCCGCCTCGTCCTCGAGGCGCTCACC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GENCECEGECT CEAGAACT CECTT CCECT CEAGET CET CECEGECEC CATEAC CAT CCEC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           GCNCTCCTCGAGCACCAGCTCTGCGGTGTNCTCCCNACGTCGNTCGANTCCTTCNGCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            ACGACTGGTTTCGGCGGCCCGACACCCCGGACTGAGGATGCNATCTCGCTCCAGAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    TCGGCGCCGCNCGCAAGGGCCGCNCNGTCCGCGTCNCAGACAGNCGACGAGATCCGCGCA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          ACCCCACCGNNACGNACGNNTCGAACTCGACGGGTACACCCTCACCCTCGGNGACGTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GCTCGCTCCTCCGACCACCCAGNNGACGCAGCTCGACATCGTNGAGNAGATCCTCGCCG
                                                                                                                                                                      TCGCAGTCGCTCACGGCCATGACGGTCGAAGCGATGGTCGGCCACGCCCGGCTCGTTCCAC
                                                                                                                                                                                                                                                                                                                                                                                    TTCAACCTCGAGCCCGTCGTCCTCGGCCCGAAGGAGGGTCTCGGTCTCGTCAACGGCACC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GGCGACCTCTCTCTCTCCTACATTGCAGCGGCCATCAGCGGTCACCCGGACAGCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           AACTTCCTCAACCACGGCATCACCCCCATCGTCCCCCTCCGCGGCACCATCTCTGCGTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GCCGCGGTCTCGAGAACTCGCTTCCCCTCGAGGTTGTTCGCGGCGCCATGACAATCCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               GCTCTCCTCGAGCACCAGCTCTGCGGTGTTCTCCCTTCGTCGTTCGACTCGTTCCGCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    ACGACTGGATTTGGCGGATCCGCAGACACCCGCACCGAGGACGCCATCTCGCTCCAGAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             AAGATTGACAAATCGGTCGAGTTCTTGCGCTCGCAACTCTCCATGAGCGTCTACGGCGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             AAGATCGACAANAGNGTCGAGTTCCTCCGNNCNCAGCTCNACAACAGNGTCTACGGNGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     TCTCGGCCGCGAGGAAGGGCAGGCCTGTCCGCGTCAAGGACAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CGCCGACCGACTCGA----CGCTCGAACTCGACGGCTACTCGCTCAACCTCGGAGACGTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   GCTCGCACCTGCCCACACCCAGGTCACGCAGGTCGACATCGTCGAGAAGATGCTCGCCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               CACGCCGNNCCGNCNNNGNCGNCNACGGGCGCCACGTCCACNCTCNGNCGGCCGNCGCNG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  ATGGCACCCTCGCTCGACTCGCACTCGTTCGCAAACGGCGTCGCATCCGCAAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          0
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            -CAATGGCGCCTCGACCAACCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Mismatches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          323;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CGACGAGATCCGCTCA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            -GCAGTCGCAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          35
              1080
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               120
                                                                                                                   1020
                                                                   996
                                                                                                                                                                      936
                                                                                                                                                                                                                         960
                                                                                                                                                                                                                                                                               876
                                                                                                                                                                                                                                                                                                                               900
                                                                                                                                                                                                                                                                                                                                                                                    816
                                                                                                                                                                                                                                                                                                                                                                                                                                    840
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          780
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  696
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        636
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              660
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              576
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   600
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         516
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               456
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    396
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   160
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   180
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         100
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       756
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          336
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     276
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        217
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          U
```

```
2101
                                                                                                                                                                                                                                                                                                                                                   1861
                                                                                                                                                                                                                                                                                                                                                                                          1777
                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1717
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1741
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1657
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1681
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1597
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1621
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1537
                                                                                                                  2041
                                                                                                                                                        1946
                                                                                                                                                                                             1981
                                                                                                                                                                                                                                    1886
                                                                                                                                                                                                                                                                        1921
                                                                                                                                                                                                                                                                                                             1837
                                                                                                                                                                                                                                                                                                                                                                                                                               1801
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1561
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1477
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1501
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1417
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1441
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1357
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1381
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1297
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1321
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1237
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1261
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1177
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1201
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1117
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1057
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1081
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 CCGCCGAGAAGGCCATCTCGCTCACGCGCNANGTCCGCGACNCCCTTCTGGNCGGCNCCGT
                                                                                                                                                                                                                                                                                                                                                 NNGTCCTCGCCNNNNGCCANNAGGTCTCGCTCGCNGCCGTCAACGCCTGGAAGGTCGCCT
                                                                                                                                                                                                                                                                                                                                                                                                                   CTCGAGCCGCGCTGGCACGACGCCTTCTCGTTCGCGACCGGCACCGTCGAGNNNNNN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CAGGCCGTCGACCTCCGCGCGATGGAGTTCGAGTTCAAGAAGCAGTTCGACCCGNTNNTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CAGCCGGCNGAGATGGGCAACCAGGCCGTCAACTCGCTCGCNCTCATCTCGGCNCGCCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GCCGCNGCNGCNTACACTTCGGAGCTCGGNCACCTTGCCAACCCGGTNACGACCCACGTC 1500
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GGCAAGCTCAACTTCACGCAGCTCACCGAGATGCTCAACGCCGGCATGAACCGCCGGCCTN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GGCCCGCTCGTCAGCGACATGATTCACGCCCACGCNGTCCTCTCGCTCGAGGCCGGNCAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                GACGACGAGGGCATTCTCCGCCAGGACCGCTACCCCGCTCCGCACGTCGCCTCAGTGGCTC
  TGACGATCGGCTCGAACGTCTCCAAGATCTACGAGGCCATCAAGTCGGGCAGGATCAACA
                          TGACGATCGGCACCAACGTCTCCCGCATCTACGAGGCCATCAAGNNCGGCNGCATCAACC
                                                                                             TCGGCGAGGAGCTCGGCGTCAAGGCCCGCCGCGGCGACGTCTTCCTCGGCAAGCAGGAGG
                                                                                                                                                                                         cercercercecececercneeracercreecececececececercreracreerice
                                                                                                                                                                                                                                                                                                           TCGTCGACGTC-----GCTCTCGCTCGCCCGCCGTCAACGCCTGGAAGGTCGCCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                   CTCGTCGAGAAGGTGAACAAGACGCTCGCCAAGCGCCTCGAGCAGACCAACTCGTACGAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      CTCGNGGACAAGGTCAACAAGNCGCTCNACAAGCGNCTCGAGCAGACCAACTCGTACGAC 1800
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             GTCTCGCTCATCGACCAGCACTTTGGCTCCGCCATGACCGGCTCGAACCTGCGCGACGAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CAAGCCATCGACTTGCGCGCGACCGAGTTCGAGTTCAAGAAGCAGTTCGGCCCAGCCATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   CAGCCGGCTGAGATGGCGAACCAGGCGGTCAACTCGCTTGCGCTCATCTCGGCTCGTCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        GCCGCTGCGGCGTACACCTCGGAGTTGGGACACCTCGCCAACCCTGTGACGACGCATGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          TTCCAGGCTGCCGCTGTGGCCAACACCATGGAGAAGACTCGCCTCGGGCCTCGCCCAGATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          GACGACGAGGGCATTCTCCGCCAGGACCGCTACCCCTTGCGCACGTCTCCTCAGTGGCTC
                                                                           ceacercercecececierceracercreececececacreagarecreacecerree
                                                                                                                                                                                                                                 CCGCCGAGTCGGCCATCTCGCTCACCCGCCAAGTCCGCGAGACCTTCTGGTCCGCCGCGT
                                                                                                                                                                                                                                                                                                                                                                                        CTCGTCCCGCGCTGGCACGACGCCTTCTCCTTCGCCGCCGCCACCGTCGTCGAGGTCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 CCCTCCTGCCTCGCGGCCGAAGACCCCCTCGCTCCTACCACTGCAAGGGCCTCGACATC 1416
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      CONTCCTGCCTCGCTGCCGAGGACCCNTCGCTCTCCTATCACTGCAAGGGCCTCGACATT 1440
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               GGCAAGCTCAACTTCACGCAGCTCACCGAGATGCTCAACGCCGGCATGAACCGCGGCCTC 1356
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             TCGACGACCGACAACCCTCTCATCGACGTCGAGAACAAGACTTCGCACCACGGCGGCAAT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        TCGACGACCGACACCCGCTCATCGACGTCGAGAACAAGANGACCCACCACGGCGGCAAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               2100
                                                                                                                                                                                                                                                                      1980
                                                                                                                                                                                                                                                                                                           1885
                                                                                                                                                                                                                                                                                                                                                 1920
                                                                                                                                                                                                                                                                                                                                                                                      1836
                                                                                                                                                                                                                                                                                                                                                                                                                             1860
                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1776
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1680
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1596
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1560
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1380
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1260
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1200
2125
                                    2160
                                                                         2065
                                                                                                                                                                                         2040
                                                                                                                                                                                                                                 1945
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1656
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1536
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1476
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1296
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1236
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1176
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1116
                                                                                                                                                      2005
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1320
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1140
```

Ş

В S 밁 Ś 밁 3 밁 Ş 밁 Ş B Ş В Ş 밁 Ş 맑 Ş 밁 Ś 뮍 Ş 밁 Ş 밁

```
Sequence 7, Application US/09765873A

Patent No. US20010053847A1

GENERAL INFORMATION:
APPLICANT: Tang, Xiao-Song
TITLE OF INVENTION: BIOPRODUCTION OF PARA-HYDROXYCINNAMIC ACI
FILE REFERENCE: BC1009 US CIP
CURRENT APPLICATION NUMBER: US/09/765,873A
CURRENT FILING DATE: 2001-01-19
PRIOR APPLICATION NUMBER: US 09/627,216
PRIOR FILING DATE: 2000-07-27
PRIOR APPLICATION NUMBER: US 60/147,719
PRIOR APPLICATION NUMBER: US 60/147,719
PRIOR APPLICATION NUMBER: US 60/147,719
PRIOR APPLICATION NUMBER: US 60/147,719
PRIOR FILING DATE: 1999-08-06
NUMBER OF SEQ ID NOS: 38
SOFTWARE: Microsoft Office 97
SEQ ID NO 71
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      LENGTH: 2151

TYPE: DNA
CAGANISM: Rhodotorula g
FEATURE:
NAME/KEY: CDS
LOCATION: (1)...(2151)
US-09-765-873A-7
                           8
                                                      В
                                                                                           Š
                                                                                                                                   뮍
                                                                                                                                                            δ
                                                                                                                                                                                                  B
                                                                                                                                                                                                                                    S
                                                                                                                                                                                                                                                                     B
                                                                                                                                                                                                                                                                                                   Ş
                                                                                                                                                                                                                                                                                                                                         В
                                                                                                                                                                                                                                                                                                                                                                    Ş
                                                                                                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                                                                                                         Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                               В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                맑
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    RESULT 12
US-09-765-873A-7
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Query Match
Best Local Similarity
Matches 1827; Conserv
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       2161
                                                                                                                                                                  421
                                541
                                                                457
                                                                                                 481
                                                                                                                                     397
                                                                                                                                                                                                      337
                                                                                                                                                                                                                                      361
                                                                                                                                                                                                                                                                        277
                                                                                                                                                                                                                                                                                                           301
                                                                                                                                                                                                                                                                                                                                         218
                                                                                                                                                                                                                                                                                                                                                                            241
                                                                                                                                                                                                                                                                                                                                                                                                              161
                                                                                                                                                                                                                                                                                                                                                                                                                                              181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                               101
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    د...ا
                       GTCAACTCGCTCACNCGCGGCCACTCGGCCNGTCCGCCTCGTCGTCCTCGAGGCGCCTCACC
                                                                                      GENCGCGGCCTCGAGAACTCGCTTCGCCTCGAGGTCGTCCGCGGCGGCGCCATGACCATCCGC
                                                                                                                                                         GCNCTCCTCGAGCACCAGCTCTGCGGTGTNCTCCCNACGTCGNTCGANTCCTTCNGCCTC
                                                                                                                                                                                                                                                                                            AAGATCGACAANAGNGTCGAGTTCCTCCGNNCNCAGCTCNACAACAGNGTCTACGGNGTC
                                                                                                                                                                                                                                                                                                                                                                                                              CGCCGACCGACTCGA---CGCTCGAACTCGACGCTACTCGCTCAACCTCGGAGACGTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                  ACCCCACCGNNACGNACGNNTCGAACTCGACGGTACACCCTCACCCTCGGNGACGTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 GCTCGCTCCCCGACCACCCAGNNGACGCAGCTCGACATCGTNGAGNAGATCCTCGCCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CACGCCGNNCCGNCNNNGNCGNCNACGGGGCGCCACGTCCACNCTCNGNCGGCCGNCGCNG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        ATGGCCCCCTCCNTCGACTCGATCGCCGACCTCGNTCGCCAACGGCNTCNCNAACGGNTNG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        ACGTCCTCGTCAAGATGCTCGCNTAG
GTCAACAGCTTGACCCGCGGCCACTCGGCTGTCCGCCTCGTCGTCCTCGAGGCGCTCACC
                                                                GGCCGCGGTCTCGAGAACTCGCTTCCCCTCGAGGTTGTTCGCGGCGCCCATGACAATCCGC
                                                                                                                                   GCTCTCCTCGAGCACCAGCTCTGCGGTGTTCTCCCTTCGTCGTTCGACTCGTTCCGCCTC
                                                                                                                                                                                                        ACGACTGGATTTGGCGGATCCGCAGACACCCGCACCGAGGACGCCATCTCGCTCCAGAAG
                                                                                                                                                                                                                                    ACGACTGGTTTCGGCGGCTCGGCCGACACCCGGACTGAGGATGCNATCTCGCTCCAGAAG
                                                                                                                                                                                                                                                                                                                                           TCTCGGCCGCGAGGAAGGGCAGGCCTGTCCGCGTCAAGGACAG-CGACGAGATCCGCTCA
                                                                                                                                                                                                                                                                                                                                                                            TCGGCGCCCCCAAGGGCCGCCCCCCCGCGTCCCAGACAGCCGACGAGATCCGCGCA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                               GCTCGCACCTGCCCACAACCCAGGTCACGCAGGTCGACATCGTCGAGAAGATGCTCGCCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 CAGGCTGT-----GCAGTCGCAGCCAACCTC-----GCAGTCGCAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    ATGGCACCCTCGCTCGACTCGATCTCGCACTCGTTCGCAAACGGCGTCGCATCCGCAAAG
                                                                                                                                                                                                                                                                        AAGATTGACAAATCGGTCGAGTTCTTGCGCTCGCAACTCTCCATGAGCGTCTACGGCGTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CCTCCTCAAGATGCTCGCTTAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     65.6%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          glutinis
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Score 1623.2; DB 9;
Pred. No. 0;
0; Mismatches 324;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        2151
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       2186
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       DB 9;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       2151;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     35
'
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Gaps
                                                                                                   540
                                                                                                                                                                    480
                                                                                                                                                                                                                                                                                                           360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               180
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  120
576
                                600
                                                                516
                                                                                                                                     456
                                                                                                                                                                                                        396
                                                                                                                                                                                                                                        420
                                                                                                                                                                                                                                                                        336
                                                                                                                                                                                                                                                                                                                                           276
                                                                                                                                                                                                                                                                                                                                                                             300
                                                                                                                                                                                                                                                                                                                                                                                                                                            240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                               160
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    60
                                                                                                                                                                                                                                                                                                                                                                                                            217
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 100
```

```
1597
                         1621
                                                   1537
                                                                               1561
                                                                                                            1477
                                                                                                                                       1501
                                                                                                                                                                    1417
                                                                                                                                                                                               1441
                                                                                                                                                                                                                           1357
                                                                                                                                                                                                                                                        1381
                                                                                                                                                                                                                                                                                    1297
                                                                                                                                                                                                                                                                                                              1321
                                                                                                                                                                                                                                                                                                                                           1237
                                                                                                                                                                                                                                                                                                                                                                       1261
                                                                                                                                                                                                                                                                                                                                                                                                    1177
                                                                                                                                                                                                                                                                                                                                                                                                                               1201
                                                                                                                                                                                                                                                                                                                                                                                                                                                          1117
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1141
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1057
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1081
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1021
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           997
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   937
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             961
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          877
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 817
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              841
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   697
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          637
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     661
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    577
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             601
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     901
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           757
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      781
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              721
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GGCGACCTCTCCCCCCTCTCTCATCGCCGCCGCCGTCACCGGTCACCCGGACNNCAAG
CAAGCCATCGACTTGCGCGCGATCGAGTTCGAGTTCAAGAAGCAGTTCGGCCCAGCCATC
                      CAGGCCGTCGACCTCCGCGCGATGGAGTTCGAGTTCAAGAAGCAGTTCGACCCGNTNNTC
                                                                            CAGCCGGCNGACATGGGCAACCAGGCCGTCAACTCGCTCGCNCTCATCTCGGCNCGCCGC
                                                                                                                                                                    GCCGCTGCGGCGTACACCTCGGAGTTGGGACACCTCGCCAACCCTGTGACGACGCATGTC
                                                                                                                                                                                      GCCGCNGCNGCNTACACTTCGGAGCTCGGNCACCTTGCCAACCCGGTNACGACCCACGTC
                                                                                                                                                                                                                            CCCTCCTGCCTCGCGGCCGAAGACCCCCTCGCTCCCTACCACTGCAAGGGCCTCGACATC
                                                                                                                                                                                                                                                                                                                GGCAAGCTCAACTTCACGCAGCTCACCGAGATGCTCAACGCCGGCATGAACCGCGGCCTN 1380
                                                                                                                                                                                                                                                                                                                                                            TCGACGACCGACAACCCGCTCATCGACGTCGAGAACAAGANGACCCACCACCACGGCGGCAAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                          GGCCCGCTCGTCAGCGACATGATTCACGCCCACGCNGTCCTCTCGCCTCGAGGCCGGNCAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   GACGACGAGGGCATTCTCCGCCAGGACCGCTACCCCCTTGCGCACGTCTCCTCAGTGGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           GACGACGAGGGCATTCTCCGCCAGGACCGCTACCCGCTCCGCACGTCGCCTCAGTGGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CGCACGCTCCTCGAGGGCAGCNNGTTTGCCGTCCACCACGAGGAGGAGGAGGAGGTCAAGGTCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CCCTTCCTTCACGACGTCACGCGCCCTCACCCGACGCAGATCGAAGTCGCGGGAAACATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CCNTTCCTCCACGACGTCACGCGCCCTCACCCGACCCAGATCGAGGTCGCGCGCAACATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             TCGCAGTCGCTCACGGCCATGACGGTCGAAGCGATGGTCGGCCACGCCGGCTCGTTCCAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     TINGGICICGAGCCCGICGICCTCGGCCCGAAGGAGGGTCTCGGTCTCGTCAACGGCACG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    GTGCACGTCGTCCACGAGGGCAAGGAGATCCTGTACGCCCGCGAGGCGATGGCGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       GTNCACGTNNTNCACGAGGGCANNGAGAAGATCATGTNCGCCCGCGAGGCGATCGCGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          GGCGACCTGTCTCCTCCTACATTGCAGCGGCCATCAGCGGTCACCCGGACAGCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    AACTTCCTCAACCACGGCATCACCCCCATCGTCCCCCTCCGCGCACCATCTCTGCGTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   AACTTCCTCAACCACGGCATCACCCCCATCGTCCCCCTCCGGGGCACCCATCTCGGCGTCG
                                                      CAGCCGGCTGAGATGGCGAACCAGGCGGTCAACTCGCTTGCGCTCATCTCGGCTCGTCGC
                                                                                                                                                                                                                                                      CONTCCTGCCTCGCTGCCGAGGACCCNTCGCTCTCTATCACTGCAAGGGCCTCGACATT
                                                                                                                                                                                                                                                                                    GGCAAGCTCAACTTCACGCAGCTCACCGAGATGCTCAACGCCGGCATGAACCGCGGCCTC
                                                                                                                                                                                                                                                                                                                                           TTCCAGGCTGCCGCTGTGGCCAACACCATGGAGAAGACTCGCCTCGGGCTCGCCCAGATC
                                                                                                                                                                                                                                                                                                                                                                                                     TCGACGACCGACAACCCTCTCATCGACGTCGAGAACAAGACTTCGCACCACGGCGGCAAT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            TTCAACCTCGAGCCCGTCGTCCTCGGCCCGAAGGAAGGTCTCGGTCTCGTCAACGGCACC
                                                                                1620
                                                                                                                                        1560
                                                                                                                                                                    1476
                                                                                                                                                                                                                              1416
                                                                                                                                                                                                                                                        1440
                                                                                                                                                                                                                                                                                    1356
                                                                                                                                                                                                                                                                                                                                             1296
                                                                                                                                                                                                                                                                                                                                                                        1320
                                                                                                                                                                                                                                                                                                                                                                                                     1236
                                                                                                                                                                                                                                                                                                                                                                                                                               1260
                                                                                                                                                                                                                                                                                                                                                                                                                                                          1176
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1200
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1116
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1140
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1080
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1020
1656
                         1680
                                                      1596
                                                                                                             1536
                                                                                                                                                                                                 1500
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1056
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    876
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               900
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        840
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    636
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     966
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             936
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       960
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           816
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    756
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                780
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           696
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       720
                                                                                                                                       ; TYPE: DNA; TYPE: DNA; COGANISM: Rhodotorula g; FEATURE: ; PEATURE: CDS; LOCATION: (1)..(2151); CHERTIFFORMATION: US-10-188-523B-7
                         망
                                                Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ₽
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 맑
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         맑
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 В
```

```
APPLICANT: Tang, Xiao-Song
TITLE OF INVENTION: BIOPRODUCTION OF PARA-HYDROXYCINNAMIC ACI
FILE REFERENCE: BC1009 US DIVCIP
CURRENT APPLICATION NUMBER: US/10/188,523B
CURRENT FILING DATE: 2002-10-17
PRIOR APPLICATION NUMBER: US 09/627,216
PRIOR APPLICATION NUMBER: US 09/627,216
PRIOR FILING DATE: 2000-07-27
PRIOR FILING DATE: 2000-07-27
PRIOR APPLICATION NUMBER: US 60/147,719
PRIOR FILING DATE: 1999-08-06
NUMBER OF SEQ ID NOS: 38
SOFTWARE: Microsoft Office 97
SEQ ID NO 7
LENGTH: 2151
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            RESULT 13
US-10-188-523B-7
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Sequence 7, Application US/10188523B Publication No. US20030170834A1 GENERAL INFORMATION:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1837
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1777
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1717
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   2126
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          2161
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           2066
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       2101
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  2006
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   2041
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1946
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1981
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1921
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1861
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1801
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                1681
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            NNGTCCTCGCCNNNNGCCANNAGGTCTCGCTCGCNGCCGTCAACGCCTGGAAGGTCGCCT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          TCCGCGAGGAGCTCCGCGTCAAGGCCCGCCGCGCGACGTCTTCCTCGGCAAGCAGGAGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CGTCGTCGTCGCCGCGCTCNCGTACCTCTCGCCGCGCACGCGCGTCCTGTACTCGTTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CCGCCGAGAAGGCCATCTCGCTCACGCGCNANGTCCGCGACNCCTTCTGGNCGGCNCCGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             CTCGAGCCGCGCTGGCACGACGCCTTCTCGTTCGCGACCGGCACCGTCGTCGAGNNNNNN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             CTCGTCGAGAAGGTGAACAAGACGCTCGCCAAGCGCCTCGAGCAGACCAACTCGTACGAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GTCTCGCTCATCGACCAGCACTTTGGCTCCGCCATGACCGGCTCGAACCTGCGCGACGAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ACGICCICCICAAGAIGCICGCIIAG 2151
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      ACGTCCTCGTCAAGATGCTCGCNTAG 2186
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   TGACGATCGAGCAACGACGATCTACGAGGCCATCAAGNNCGGCNGCATCAACC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             ceaccicercecececicicaceine con accircice ce ce ce ca circa cancice con accircice ceaccice con accircice ceaccice cancice con accircice con accircice con accircice con accircice con accircic con accircic con accircic con accircic con accircic con accircic con accircic con accircic con accircic con accircic con accircic con accircic con accircic con accircic con accircic con accircic con accircic con accircic con accircic con accircic con accircic con accircic con accircic con accircic con accircic con accircic con accircic con accircic con accircic con accircic con accircic con accircic con accircic con accircic con accircic con accircic con accircic con accircic con accircic con accircic con accircic con accircic con accircic con accircic con accircic con accircic con accircic con accircic con accircic con accircic con accircic con accircic con accircic con accircic con accircic con accircic con accircic con accircic con accircic con accircic con accircic con accircic con accircic con accircic con accircic con accircic con accircic con accircic con accircic con accircio con accircio con accircio con accircio con accircio con accircio con accircio con accircio con accircio con accircio con accircio con accircio con accircio con accircio con accircio con accircio con accircio con accircio con accircio con accircio con accircio con accircio con accircio con accircio con accircio con accircio con accircio con accircio con accircio con accircio con accircio con accircio con accircio con accircio con accircio con accircio con accircio con accircio con accircio con accircio con accircio con accircio con accircio con accircio con accircio con accircio con accircio con accircio con accircio con accircio con accircio con accircio con accircio con accircio con accircio con accircio con accircio con accircio con accircio con accircio con accircio con accircio con accircio con accircio con accircio con accircio con accircio con accircio con accircio con accircio con accircio con accircio con accircio con accircio con accirc
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            ccecceaerceeccarcreecreacceeccaaerceeceaeaccrrereerceececer
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   TCGTCGACGTC-----
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CTCGTCCCGCGCTGGCACGACGCCTTCTCCTTCGCCGCCGGCACCGTCGTCGAGGTCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CTCGNGGACAAGGTCAACAAGNCGCTCNACAAGCGNCTCGAGCAGACCAACTCGTACGAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      TGACGATCGGCTCGAACGTCTCCAAGATCTACGAGGCCATCAAGTCGGGCAGGATCAACA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        -ĠĊŦĊŦĊĠĊŦĊĠĊĊĠĊĊĠŦĊĂĂĊĠĊĊŦĠĠĂĀĠĠŦĊĠĊĊĠ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     2125
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         2005
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1945
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1980
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1920
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1836
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1860
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1776
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             2065
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        2100
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                2040
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1885
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1800
```

```
Ş
                                                                                              Query Match
Best Local Similarity 83.0
Matches 1827; Conservative
                 61
CACGCCGNNCCGNCNNNGNCGNCNACGGGCGCCACGTCCACNCTCNGNCGGCCGNCGCNG
                                                       ATGGCCCCCTCCNTCGACTCGATCGCGACCCTCGNTCGCCAACGGCNTCNCNAACGGNTNG
                                           ATGGCACCCTCGCTCGACTCGATCTCGCACTCGTTCGCAAACGGCGTCGCATCCGCAAAG
                                                                                                          65.6%;
                                                                                              ; Score 1623.2; pred. No. 0; Mismatches
                                                                                                 324; Indels
                                                                                                 35;
                                                                                                   Gaps
                                                                        60
                     120
                                             9
                                                                                                 G
```

DB 15;

Length 2151;

glutinis

8 Ъ S βď Ś B 8 뮹 Ś 밁 Ś 망 8 밁 Ş 밁 Ş 밁 Ś 밁 5 占 8 밁 δ 밁 Ş В δÃ В Ś Дb 8 밁 Š

	1141 GGCCCGCTCGTCAGCGACATGATTCACGCCCACGCNGTCCTCGCCTCG
	1081 GACGACGAGGGCATTCTCCGCCAGGACCGCTACCCGCTCCGCACGTCGCCTCAGTGGCTC 1140
	1021 CGCACGCTCCTCGAGGGCAGCNNGTTTGCCGTCCACCACGAGGAGGAGGTCAAGGTCAAG 1080
	961 CONTICCTCCACGACGTCACGCGCCCTCACCCGACCCAGATCGAGGTCGCGCGCAACATC 1020
· · · · · · · · · · · · · · · · · · ·	901 TCGCAGGCCTCACGGCTCTNACGGTCGAGGCCATGGTCGGCCACGCCGGCTCGTTCCAC 960
	841 GCCGTCTCCGCCTCGATGGCGACCCTCGCTCTGCACGACGACACACATGCTCTCGCTCCTC 900
	781 TINGGICTCGAGCCCGICGICCTCGGCCCGAAGGAGGGTCTCGGTCTCAACGGCACG 840
	721 GTNCACGTNNTNCACGAGGGCANNGAGAAGATCATGTNCGCCCGCGAGGCGATCGCGCTC 780
	661 GGCGACCTCTCCCCNCTCTCNTACATCGCCGCCGCCATCACCCGGTCACCCCGGACNNCAAG 720
	601 AACTICOTCAACCACGGCATCACCCCCATCGICCCCCCCCGCGGGACCATCTCGGGGGICG 660
	541 GTCAACTCGCTCACNCGCGGCCACTCGGCNGTCCGCTCGTCGTCGTCGAGGCGCTCACC 600
	481 GENCEGEGECTICEAGAACTICECTTICCECTICEAGETICETICCECEGEGEGECEATGACCATICEGE 540
	421 GENETECTEGAGEACEAGETETGEGGTGTNETECECNACGTEGNTEGANTECTTENGECTE 480
	361 ACGACTGGTTTCGGCGGCTCGGCCGACACCCCGGACTGAGGATGCNATCTCGCTCCAGAAG 420
	301 AAGATCGACAANAGNGTCGAGTTCCTCCGNNCNCAGCTCNACAACAGNGTCTACGGNGTC 360
	241 TOGGCGCCGCNCGCAAGGGCCGCNCNGTCCGCGTCNCAGACAGNGNCGACGAGGATCCGCGCA 300
8	181 ACCCCACCGNNACGNANGNNNTCGAACTCGACGGTACACCCTCACCCTCGGNGACGTCG 240
	121 GCTCGCTCCCCGACCAGUNGACGCAGCTCGACATCGTNGAGNAGATCCTCGCCG 180
	61 CAGGCTGTCAATGGCGCCTCGACCAACCTCGCAGTCGCAG 100

DЪ

8 B 8

B 8 B

B 8

₽

δ

B 85 B

8 8 8

ממ	. Q	В	Qγ	g	γ0	₽	Ş	β	γQ	ф	ş	븅	Ş	ФQ	Ϋ́	дb	γQ	ф	Ş	Db.	γQ	DЬ	δ	dd	Ş	Db	8	Dβ	νΩ	Дb	Qy	ర్జ	δ,
126 ACGICCTCCTCAAGAIGCICGCTIAG 21	61 ACGTCCTCGTCAAGATGCTCGCNTAG 218	066 TGACGATCGGCTCGAACGTCTCCAAGATCTACGAGGCCATCAAGTCC	CGATCGGCACCAACGTCTCCCGCATCTACGAGGCCATCAAGNNCGGCNGCATCA	CCGCGAGGAGCTTCGCCGTCAAGGCCCGCCGCCGAGACGTCTTCCTTC	GGAGCTCGGCGTCAAGGCCCGCCGCGGCGACGTCTTCCTCGGCAAGCAGGA	ACCTCGTCGCCCGCGCTCTCGTACCTCTCGCCGCGCACTCAGATCCTCTACGCCTTC	981 CGTCGTCGTCGCCCCCCCCCTACCTTCGCCCGCGCACGCGCGCG	886 CCGCCGAGTCGGCCATCTCGCTCACCCGCCAAGTCCGCCGAGACCCTTCTGGTCCGCCGCG	921 CCGCCGAGAAGGCCATCTCGCTCACGCGCNANGTCCGCGACNCCTTCTGGNCGGCN	GTCGCTCTCGCTCGCCGTCAACGCCTGGAAGGTCG	TCCTCGCCNNNNGCCANNAGGTCTCGCTCGCNGCCGTCAACGCCTGGAAGGTCGC	1777 CTCGTCCCGCGCTGGCACGACGCCTTCTCCTTCGCCGCCGGCACCGTCGTCGAGGTCCTC 1836	01 CTCGAGCCGCGCTGGCACGACGCCTTCTCGCGACCGGCACCGGTCGTC	1717 CTCGTCGAGAAGGTGAACAAGACGCTCGCCAAGCCCTCGAGCAGCCAACTCGTACGAC 1776	GNGGACAAGGTCAACAAGNCGCTCNACAAGCGNCTCGAGCAGACCAACTCGTACGA	1657 GTCTCGCTCATCGACCAGCACTTTGGCTCCGCCATGACCGGCTCGAACCTGCGCGACGAC	81 NCNNCGCTCNTCNAGCAGCACTTTGGCNCNGCCCTCGACGGCNNNNNNNNNN	1597 CAAGCCATCGACTTGCGCGCATCGAGTTCGAGTTCAAGAAGCAGTTCGGCCCAGCCATC 1656	21 CAGGCCGTCGACCTCCGCGCGATGGAGTTCGAGTTCAAGAAGCAGTTCGACCCGNTNNT	1537 ACGACCGAGTCCAACGACGTCCTTTCTCTCCTCCTCCCCACCCCACCTTACTGCGTTCTC 1596	CNGCCGAGGCCAACGACGTCCTTTCTCTCTCCTCCTCGCCACCTCTACTGCGTNCT	477 CAGCCGGCTGAGATGGCGAACCAGGCGGTCAACTCGCTTGCGCTCATCTCGGCTCGTCG	501 CAGCCGGCNGAGATGGGCAACCAGGCCGTCAACTCGCTCGCNCTCATCTCGGCNCGC	1417 GCCGCTGCGGCGTACACCTCGGAGTTGGGACACCTCGCCAACCCTGTGACGACGCATGTC 1476	441 GCCGCNGCNGACACTTCGGAGCTCGGNCACCTTGCCAACCCGGTNACGACCCACGT	1357 CCCTCCTCGCGCCGAAGACCCCTCGCTCTCCTACCACTGCAAGGGCCTCGACATC 1416	381 CONTCCTGCCTGCCGAGGACCONTCGCTCTCCTATCACTGCAAGGGCCTCGACA		321 GGCAAGCTCAACTTCACGCAGCTCACCGAGATGCTCAACGCCGGCATGAACCGCGGG	1237 TICCAGGCTGCGGCGAGACACCATGGAGAAGACTCGCCTCGGGCTCGCCCAGATC 1296	261 TTCCAGGCGNCCGCTGTCGCNAACACGATGGAGAAGACTCGCCTCGC	1177 TCGACGACCACCCTCTCATCGACGTCGAGAACAAGACTTCGCACCACGGCGGCAAT 1236	CGACGACGACAACCCGCTCATCGACGTCGAGAACAAGANGACCCACCACCACGGCGGC

RESULT 14 US-10-374-366-1 ; Sequence 1, Application US/10374366

g 42

g 8

B S

Ş

유정

당 성 당

```
Publication No. US20040014085A1
(GENERAL INFORMATION:
APPLICANT: Tang, Xiao-Song
APPLICANT: Milano, Joseph
TITLE OF INVENTION: METHOD FOR THE RECOMBINA
FILE REFERENCE: CL1794 US NA
CURRENT APPLICATION NUMBER: US/10/374,366
CURRENT FILING DATE: 2003-02-26
PRIOR APPLICATION NUMBER: 60/360,279
PRIOR FILING DATE: 2002-02-26
NUMBER OF SEQ ID NOS: 203
SOFTMARE: Patentin version 3.2
SEQ ID NO 1
LENGTH: 2151
                5
                                            유성
                                                                                     4 A
                                                                                                                                                          성 유
                                                                                                                                                                                                           5
                                                                                                                                                                                                                                 당
                                                                                                                                                                                                                                                          5
                                                                                                                                                                                                                                                                                   B
                                                                                                                                                                                                                                                                                                         Ş
                                                                                                                                                                                                                                                                                                                                       뫄
                                                                                                                                                                                                                                                                                                                                                        S
                                                                                                                                                                                                                                                                                                                                                                                 뫄
                                                                                                                                                                                                                                                                                                                                                                                                           Š
                                                                                                                                                                                                                                                                                                                                                                                                                                      멍
                                                                                                                                                                                                                                                                                                                                                                                                                                                        5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Вb
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       US-10-374-366-1
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Query Match
Best Local Similarity
Matches 1827; Conserv
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            LENGTH: 2151

TYPE: DNA
ORGANISM: Rhodosporidium
697
                                             637
                                                                  661
                                                                                           577
                                                                                                                    601
                                                                                                                                           517
                                                                                                                                                                                           457
                                                                                                                                                                                                                    481
                                                                                                                                                                                                                                           397
                    721
                                                                                                                                                                 541
                                                                                                                                                                                                                                                                   421
                                                                                                                                                                                                                                                                                          337
                                                                                                                                                                                                                                                                                                                 361
                                                                                                                                                                                                                                                                                                                                          277
                                                                                                                                                                                                                                                                                                                                                                 301
                                                                                                                                                                                                                                                                                                                                                                                          218
                                                                                                                                                                                                                                                                                                                                                                                                                 241
                                                                                                                                                                                                                                                                                                                                                                                                                                          161
                                                                                                                                                                                                                                                                                                                                                                                                                                                                 181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          101
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 13
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Ъ
GTGCACGTCGTCCACGAGGCAAGGAAGATCCTGTACGCCCGCGAGGCGATGGCGCTC
              GTNCACGTNNTNCACGAGGGCANNGAGAAGATCATGTNCGCCCGCGAGGCGATCGCGCTC
                                                              GGCGACCTCTCCCCNCTCTCNTACATCGCCGCCGTCATCACCGGGTCACCCGGGACNNCAAG
                                                                                                       AACTICCTCAACCACGGCATCACCCCCATCGTCCCCCTCCGGGGCACCATCTCGGGGTCG
                                                                                                                                                                                                                                                        GCNCTCCTCGAGCACCAGCTCTGCGGTGTNCTCCCNACGTCGNTCGANTCCTTCNGCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                          CGCCGACTCGA----CGCTCGAACTCGACGCTTAATCCTCAACCTCGAGACGTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          GCTCGCTCCCCGACCACCCAGNNGACGCAGCTCGACATCGTNGAGNAGATCCTCGCCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CACGCCGNNCCGNCNNNGNCGNCNACGGGCGCCACGTCCACNCTCNGNCGGCCGNCGCNG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         ATGGCACCCTCGCTCGACTCGATCTCGCACTCGTTCGCAAACGGCGTCGCATCCGCAAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          ATGGCCCCCTCCNTCGACTCGATCGCGACCTCGNTCGCCAACGGCNTCNCNAACGGNTNG
                                                                                           AACTTCCTCAACCACGGCATCACCCCCATCGTCCCCCTCCGCGGCACCATCTCTGCGTCG
                                                                                                                                             GTCAACAGCTTGACCCGCGGCCACTCGGCTGTCCGCCTCGTCGTCCTCGAGGCGCTCACC
                                                                                                                                                           GTCAACTCGCTCACNCGCGGCCACTCGGCNGTCCGCCTCGTCGTCCTCCAGGCGCTCACC
                                                                                                                                                                                             GGCCGCGGTCTCGAGAACTCGCTTCCCCCTCGAGGTTGTTCGCGGCGCCCATGACAATCCGC
                                                                                                                                                                                                           GGNCGCGGCCTCGAGAAACTCGCTTCCGCTCGAGGTCGTCCGCGGCGCCATGACCATCCGC
                                                                                                                                                                                                                                             GCTCTCCTCGAGCACCAGCTCTGCGGTGTTCTCCCTTCGTCGTTCGACTCGTTCCGCCTC
                                                                                                                                                                                                                                                                                                            ACGACTGGTTTCGGCGGCTCGGCCGACACCCCGGACTGAGGATGCNATCTCGCTCCAGAAG
                                                                                                                                                                                                                                                                                                                                           AAGATTGACAAATCGGTCGAGTTCTTGCGCTCGCAACTCTCCATGAGCGTCTACGGCGTC
                                                                                                                                                                                                                                                                                                                                                         AAGATCGACAANAGNGTCGAGTTCCTCCGNNCNCAGCTCNACAACAGNGTCTACGGNGTC
                                                                                                                                                                                                                                                                                                                                                                                           TOTOGGOCGAGGAAGGGCAGGCCTGTCCGCGTCAAGGACAG-CGACGAGATCCGCTCA
                                                                                                                                                                                                                                                                                                                                                                                                        TCGGCGCCCCAAGGGCCGCCNCNGTCCGCGTCNCAGACAGNCGACGAGATCCGCGCA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ACCCCACCGNNACGNACGNNNTCGAACTCGACGGGTACACCCTCACCCTCGGNGACGTCG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CAGGCTGT----
                                                                                                                                                                                                                                                                                          ACGACTGGATTTGGCGGATCCGCAGACACCCGCACGACGCCATCTCGCTCCAGAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       65.6%; ilarity 83.6%; Conservative
                                              CTCCTCTCTCCTACATTGCAGCGGCCATCAGCGGTCACCCGGACAGCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  glutinis
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          ------CAATGGCGCCTCGACCAACCTC----GCAGTCGCAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       FOR THE RECOMBINATION
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Score 1623.2;
Pred. No. 0;
0; Mismatches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        0;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        324;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               DB
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 16;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        얶
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        GENETIC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         ELEMENTS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        35,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 2151;
756
                                              696
                                                                     720
                                                                                                                    660
                                                                                                                                             576
                                                                                                                                                                     600
                                                                                                                                                                                             516
                                                                                                                                                                                                                    540
                                                                                                                                                                                                                                           456
                                                                                                                                                                                                                                                                    480
                                                                                                                                                                                                                                                                                            396
                                                                                                                                                                                                                                                                                                                   420
                                                                                                                                                                                                                                                                                                                                           336
                                                                                                                                                                                                                                                                                                                                                                  360
                                                                                                                                                                                                                                                                                                                                                                                          276
                                                                                                                                                                                                                                                                                                                                                                                                                                                                240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          100
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  120
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         9
                                                                                             636
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           160
           밁
                           5
                                                          뫄
                                                                         5
                                                                                                        밁
                                                                                                                            Ş
                                                                                                                                                  뫄
                                                                                                                                                                          Ś
                                                                                                                                                                                                        В
                                                                                                                                                                                                                         Ş
                                                                                                                                                                                                                                                    당
                                                                                                                                                                                                                                                                        Ϋ́
                                                                                                                                                                                                                                                                                                      망
                                                                                                                                                                                                                                                                                                                          5
                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                        δ
                                                                                                                                                                                                                                                                                                                                                                                                    뫄
                                                                                                                                                                                                                                                                                                                                                                                                                         Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                     日
                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      δÃ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  망
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             문
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1177
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1117
                                  1801
                                                                                                                                                        1597
                                                                                                                                                                                                        1537
                                                                                                                                                                                                                                 1561
                                                                                                                                                                                                                                                        1477
                                                                                                                                                                                                                                                                                                       1417
                                                                                                                                                                                                                                                                                                                               1441
                                                                                                                                                                                                                                                                                                                                                                                                       1297
                                                                                                                                                                                                                                                                                                                                                                                                                              1321
                                                                                                                                                                                                                                                                                                                                                                                                                                                       1237
                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1261
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1141
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1081
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1021
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     997
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     937
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           961
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    877
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           901
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  817
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           841
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   757
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         781
                                                                                                                        GCCGCTGCGGCGTACACCTCGGAGTTGGGACACCTCGCCAACCCTGTGACGACGCATGTC
                                                                                                                                                                                                                                                                                                                    GCCGCNGCNTACACTTCGGAGCTCGGNCACCTTGCCAACCCGGTNACGACCCACGTC
                                                                                                                                                                                                                                                                                                                                                                                                                      GGCAAGCTCAACTTCACGCAGCTCACCGAGATGCTCAACGCCGGCATGAACCGCGGCCTN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CGCACGCTCCTCGAGGGCAGCNNGTTTGCCGTCCACCACGAGGAGGAGGTCAAGGTCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GCCGTCTCCGCCTCGATGGCGACCCTCCGCTCTGCACGACGACGCACACATGCTCTCGCTCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  TINGGTCTCGAGCCCGTCGTCCTCGGCCCGAAGGAGGGTCTCGGTCTCGTCAACGGCACG
           CTCGTCCCGCGCTGGCACGACGCCTTCTCCTTCGCCGCCGGCACCGTCGTCGAGGTCCTC
                             CTCGAGCCGCGCTGGCACGACGCCTTCTCGTTCGCGACCGGCACCGTCGTCGAGNNNNNN
                                                                                 CTCGNGGACAAGGTCAACAAGNCGCTCNACAAGCGNCTCGAGCAGACCAACTCGTACGAC
                                                                                                        GTCTCGCTCATCGACCAGCACTTTGGCTCCGCCATGACCGGCTCGAACCTGCGCGACGAG
                                                                                                                                                                       CAGGCCGTCGACCTCCGCGCGATGGAGGTTCGAGTTCAAGAAGCAGTTCGACCCGNTNNTC
                                                                                                                                                                                                                        CAGCCGGCNGAGATGGGCAACCAGGCCGTCAACTCCGCTCGCNCTCATCTCGGCNCGCCGC
                                                                                                                                                                                                                                                                                                                                                        CCCTCCTGCCTCGCGAAGACCCCTCGCTCTCCTACCACTGCAAGGGCCTCGACATC
                                                                                                                                                                                                                                                                                                                                                                    GGCAAGCTCAACTTCACGCAGCTCACCGAGATGCTCAACGCCGGCATGAACCGCGGGCCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GACGACGAGGGCATTCTCCGCCAGGACCGCTACCCCTTGCGCACGTCTCCTCAGTGGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GACGACGAGGGCATTCTCCGCCAGGACCGCTACCCGCTCCGCCACGTCGCCTCAGTGGCTC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CGCAAGCTCCTCGAGGGAAGCCGCTTTGCTGTCCACCATGAGGAGGAGGTCAAGGTCAAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   TCGCAGGCCTCACGGCTCTNACGGTCGAGGCCATGGTCGGCCACGCCGGCTCGTTCCAC
                                                                                                                                                          CAAGCCATCGACTTGCGCGCGATCGAGTTCGAGTTCAAGAAGCAGTTCGGCCCAGCCATC
                                                                                                                                                                                                          CAGCCGGCTGAGATGGCGAACCAGGCGGTCAACTCGCTTGCGCTCATCTCGGCTCGTCGC
                                                                                                                                                                                                                                                                                                                                                                                                                                                        TTCCAGGCTGCGGCTGTGGCCAACACCATGGAGAAGACTCGCCTCGGGCTCGCCCAGATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        egecegeregreagegaeerearreaceceaegecerecreacearegaegecegeceae
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CCCTTCCTTCACGACGTCACGCGCCCTCACCCGACGCAGATCGAAGTCGCGGGAAACATC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    TCGCAGTCGCTCACGGCCATGACGGTCGAAGCGATGGTCGGCCACGCCGGCTCGTTCCAC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GCCGTCTCAGCATCGATGGCCACCCTCGCTCTGCACGACGCTCACATGCTCTCGCTCCTC
              1836
                                                                                                            1716
                                                                                                                                                                                                                                                                                   1560
                                                                                                                                                                                                                                                                                                                                                         1416
                                                                                                                                                                                                                                                                                                                                                                                  1440
                                                                                                                                                                                                                                                                                                                                                                                                                                 1380
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1320
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1236
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1260
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1200
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1116
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1056
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1080
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1020
                                                                                    1800
                                                                                                                                                            1656
                                                                                                                                                                                  1680
                                                                                                                                                                                                            1596
                                                                                                                                                                                                                                   1620
                                                                                                                                                                                                                                                          1536
                                                                                                                                                                                                                                                                                                           1476
                                                                                                                                                                                                                                                                                                                                 1500
                                                                                                                                                                                                                                                                                                                                                                                                                                                         1296
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1140
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     876
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      816
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            840
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      996
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      936
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              960
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             900
```

|--|

	leted: September 12, 2004, 12:22:21	Search compl	ro.
	26 ACGTCCTCCAAGATGCTCGCTTAG 2151	Db 212	ы
	-	Qy 216	$\sim$
2125	σ	Db 206	н
2160	1 TGACGATCGGCACCAACGTCTCCCGCATCTACGAGGCCATCAAGNNCGGCNGCATCAACC	Qy 210	$\sim$
2065	ð	Db 200	
2100	41 TCCGCGAGGAGCTCGGCGTCAAGGCCCGCCGCGGCGACGTCTTCCTCGGCAAGCAGGAGGAGG	Qy 204	~
2005	9	Db 194	н
2040	81 CGTCGTCGCGCGCGCTCNCGTACCTCTCGCCGCAACGCGCTCCTGTACTCGTTCG	Оу 198	_
1945	6	Db 188	н
1980	<b>⊢-</b> -	Оу 192	0
1885	7	Db 183	н
1920		Qy 1861	•
1836	7 CTCG	Db 177	н
1860	)1 CTCGAGCCGCGCTGGCACGCCTTCTCGTTCGCGACCGGCACCGTCGTCGAGNNNNNN	Оу 1801	0
1776		Db 1 <sup>'</sup> 71	н
1800	41 CTCGNGGACAAGGTCAACAAGNCGCTCNACAAGCGNCTCGAGCAAGCAACCCAACTCGTACGAC	Qy 174	0
1716	7	Db 165	н
1740	81 NCNNCGCTCNTCNAGCAGCACTTTGGCNCNGCCCTCGACGGCNNNNNNNNNN	Оу 168	0
1656	97 CAAGCCATCGACTTGCGCGCGACCGAGTTCGAGTTCAAGAAGCAGTTCGGCCCAGCCATC	Db 159	н
1680	21 CAGGCCGTCGACCTCCGCGCGATGGAGTTCGAGTTCGAGGAGCAGTTCGACCCGNTNNTC	Оу 162	0
1596	7	Db 153	н
1620	$\vdash$	Qy 156	0
1536	77 CAGCCGGCTGAGATGGCGAACCAGGCGGTCAACTCGCTTGCGCTCATCTCGGCTCGTCGC	Db 147	П
1560	01 CAGCCGGCNGAGATGGGCAACCAGGCCGTCAACTCGCTCGCNCTCATCTCGGCNCGCCGC	Qy . 150	Ω
1476	7	Db 141	н
1500	1 GCCGCNGCNGCNTACACTTCGGAGCTCGGNCACCTTGCCAACCCGGTNACGACCCACGTC	Qy 1441	0

Search completed: September 12, 2004, 12:22:21 Job time: 1619.68 secs

```
Minimum
Maximum
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Result
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Post-processing: Minimum Match 0%
Maximum Match 100%
Listing first 45 sm
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Scoring table:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Title:
Perfect score:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Total number
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        OM protein
                                                                                                                                                                                                                                                      110
110
112
113
113
114
115
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Pred. No. is the number of results predicted by chance to have a score greater than or equal to the score of the result being printed, and is derived by analysis of the total score distribution.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           DB DB
     Score
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         seq
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               of hits satisfying
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   protein search, using sw model
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      length:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           55465
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         BLOSUM62
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               US-09-939-408A-21
3365
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              389414 seqs, 51625971 residues
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Gapop 10.0 ,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       September
     Issued_Patents_AA:*

| (cgn2=6/ptodata/2/iaa/5A_COMB.pep:*
| (cgn2=6/ptodata/2/iaa/5B_COMB.pep:*
| (cgn2=6/ptodata/2/iaa/6A_COMB.pep:*
| (cgn2=6/ptodata/2/iaa/6B_COMB.pep:*
| (cgn2=6/ptodata/2/iaa/POTUS_COMB.pep:*
| (cgn2=6/ptodata/2/iaa/backfIles1.pep:*
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        MAPSLDSIATSXANGXXNGX.....
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GenCore version 5.1.6
Copyright (c) 1993 - 2004 Compugen Ltd.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              2000000000
                                                                           9, 2004, 10:01:03 ; Search time 23.5975 Seconds (without alignments) 1588.322 Million cell updates/sec
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Gapext 0
                    US-09-624-693A-19
US-09-627-216A-8
US-09-655-873A-10
US-09-765-873A-36
US-09-765-873A-35
US-09-765-873A-35
US-09-765-873A-35
US-09-765-873A-36
US-09-765-873A-37
US-09-765-873A-33
US-09-765-873A-33
US-09-765-873A-33
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693A-13
US-09-624-693
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 chosen
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  US-09-624-693A-21
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              summaries
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               SUMMARIES
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 parameters:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        .RIYEAIKSGRINXVLVKMLA 726
                                                                                                                                                                                                                                                                         Sequence
Sequence
Sequence
Sequence
Sequence
                                                                                                                                                                                                                                                                                                                                                                                                                     Sequence
Sequence
Sequence
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Sequence
Sequence
Sequence
                       Sequence
Sequence
Sequence
                                                                                                                                                                                                                          Sequence
Sequence
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Description
                                                                                                                                                 Sequence
Sequence
                                                                                                  Sequence
                                                                                                                                                                                                  Sequence
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Sequence
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Sequence
                                                                                                                            Sequence
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Sequence
e 11, Applee 6 10, Applie 6 10, Applie 6 10, Applie 6 37, Applee 37, Applee 37, Applee 37, Applee 37, Applee 37, Applee 37, Applee 37, Applee 37, Applee 37, Applee 37, Applee 37, Applee 37, Applee 37, Applee 37, Applee 37, Applee 37, Applee 37, Applee 37, Applee 37, Applee 33046, Applee 327, Applee 33046, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327, Applee 327,
```

108 3.2 50.5 4 US-09-562-91A-23925 104 3.1 744 1 US-09-252-91A-23925 102.5 3.0 1011 4 US-09-252-91A-2505 100.5 3.0 555 4 US-09-543-681A-9998 100 3.0 1589 4 US-09-543-681A-9998 99.5 3.0 1024 4 US-09-543-681A-9998 99.5 2.9 404 4 US-09-328-352-4894 95.5 2.9 404 4 US-09-328-352-4894 95.5 2.8 607 3 US-09-9662-737-45 94 2.8 555 1 US-08-687-852-6 94 2.8 555 2 US-08-69-683A-59 94 2.8 555 2 US-08-69-683A-59 94 2.8 555 2 US-08-687-31916 93.5 2.8 1024 4 US-09-562-737-47 93.5 2.8 1024 4 US-09-562-737-49 93.5 2.8 1495 4 US-09-562-737-49 93.5 2.8 1495 4 US-09-562-737-49 93.5 2.8 1495 4 US-09-562-737-49 93.5 2.8 1495 4 US-09-562-737-49	44 U1	44	43	42	41	40	3 9	ω 8	37	9	ω Ui	3 4	ü	32	31	30	29	83
. 2 1024 1 US-09 .1 1744 1 US-09 .1 1744 1 US-09 .1 1744 1 US-09 .0 1589 4 US-09 .0 1589 4 US-09 .0 1044 4 US-09 .9 875 4 US-09 .9 875 2 US-09 .8 8555 1 US-08 .8 8555 2 US-08 .8 1024 4 US-09 .8 1495 4 US-09	93.5	93.5	·	ω.	94	94	94	4	U	96	96.5	99.5	100	100.5	102.5	104	106	108
500 4 1 US - 09																		
80-80 80-80 80-80 80-80 80-80 80-80 80-80 80-80	1495	1495	1024	1024	764	555	555	607	836	875	404	1024	1589	555	21	744	505	1024
	4.	4,	4,	4	4	N	ب	ω	4	4	4	4.	4	4	4	۱	4	4
	-09	-08-522-726B-	-09-562-737-4	-09-562-737	-09-252-991A-3181	-08-687-852-	-08-440-377A-	-08-969-683A-5	-09	-09	-09	-09	-09-543-681A-499	-09-543-681A-787	1-09-252-991A-2250	-08-764-100-2	-09-252-991A-2392	-60-
	1, Appli	1, Appli	•	47, App	31816, 1	6, Appl:	6, Appl:	59, Appl	23513, 1	4884, Ap	6480, A	45, Appl	4998, A	7878, Ap	250	25, Appl	392	44, APPI

## ALIGNMENTS

```
Sequence 21, Application US/09624693A

Patent No. 6355468
GENERAL INFORMATION:
APPLICANT: Yoshida, Roberta
APPLICANT: Yoshida, Roberta
APPLICANT: Yoshida, Roberta
ITILE OF INVENTION: Polymucleotide Sequences and Methods of Obtaining and
ITILE OF INVENTION: Using Same
FILE REFERENCE: 29479/500NSC
CURRENT APPLICATION NUMBER: US/09/624,693A
CURRENT FILING DATE: 2000-07-24
NUMBER OF SEQ ID NOS: 25
SOFTWARE: Patentin Ver. 2.0
SEQ ID NO 21
LENGTH: 726
TYPE: PRT
ORGANISM: Artificial Sequence
                                       뮍
                                                                 δ
                                                                                                                 В
                                                                                                                                                Ş
                                                                                                                                                                                             В
                                                                                                                                                                                                                                Š
                                                                                                                                                                                                                                                                         뮍
                                                                                                                                                                                                                                                                                                        Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                US-09-624-693A-21
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              US-09-624-693A-21
                                                                                                                                                                                                                                                                                                                                                     Best Loc
Matches
                                                                                                                                                                                                                                                                                                                                                                                           Query Match
                                                                                                                                                                                                                                                                                                                                                                                                                                                  NAME/KBY: SITE

LOCATION: (12, 16, 17, 20, 24, 25, 28 - 36, 38, 42, 47, 48, 56, 57, 62, INCRATION: "Xaa" means any amino acid; "Xaa" means no consensus OTHER INFORMATION: position

OTHER INFORMATION: Description of Artificial Sequence: Consensus of OTHER INFORMATION: SEQ ID NOS: 13, 17, and 19
                                                                                                                                                                                                                                                                                                                                     Local s. 726;
                                       181
                                                                                                                     121
                                                                            181
                                                                                                                                                                                               61
                                                                                                                                                                                                                                    13
                                                                                                                                                                                                                                                                                                                                                                        Similarity
HVXHEGXEKIMXAREAIALFGLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                       NSLTRGHSAVRLVVLEALTNFLNHGITFIVPLRGTISASGDLSPLSYIAAAITGHPDSKV
                                                               NSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAITGHPDSXV
                                                                                                                                            TGFGGSADTRTEDAISLQKALLEHQLCGVLPTSXDSFXLGRGLENSLPLEVVRGAMTIRV
                                                                                                                                                                                                                          PXTDDXXELDGYSLTLGDVVGAARKGRXVRVXDSDEIRXKIDKSVEFLRXQLXNSVYGVT
                                                                                                                                                                                                                                                                           MAPSLDSIATSXANGXXNGXHAAXXASXXXXXXXXXXXAXAGSXLPTTXXTQLDIVEXXLAD
                                                                                                                                                                                                                                                                                                        MAPSLDSIATSXANGXXNGXHAAXXASXXXXXXXXXAXAGSXLPTTXXTQLDIVEXXLAD
                                                                                                                                                                                             PXTDDXXELDGYSLTLGDVVGAARKGRXVRVXDSDEIRXKIDKSVEFLRXQLXNSVYGVT
                                                                                                                     TGFGGSADTRTEDAISLQKALLEHQLCGVLPTSXDSFXLGRGLENSLPLEVVRGAMTIRV
                                                                                                                                                                                                                                                                                                                                                 95.8%; Score 3223; I larity 100.0%; Pred. No. 0; Conservative 0; Mismatches
                                                                                                                                                                                                                                                                                                                                                                                           DB 4;
                                                                                                                                                                                                                                                                                                                                                     0;
                                                                                                                                                                                                                                                                                                                                                                                        Length 726;
                                                                                                                                                                                                                                                                                                                                                     Indels
                                                                                                                                                                                                                                                                                                                                                     0;
                                                                                                                                                                                                                                                                                                                                                     Gaps
                                                                                                                                                                                                                                      120
                                                                                                                                                          180
  300
                                       240
                                                                              240
                                                                                                                     180
                                                                                                                                                                                                 120
                                                                                                                                                                                                                                                                           60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              at that
                                                                                                                                                                                                                                                                                                                                                     0
```

473 480 413 420 353 360 293 300 233

```
В
                                                      8
                                                                                           멍
                                                                                                                           Ş
                                                                                                                                                     B
                                                                                                                                                                                         8
                                                                                                                                                                                                                                                                                             ; TYPE: PRT; ORGANISM: Rhodotorula US-09-624-693A-19
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                RESULT 2
US-09-624-693A-19
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           음 성 음
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                음 성 음
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       요 성
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            $
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Дb
                                                                                                                                                                                                                                                                                                                                               CURRENT APPLICATION NUMBER: US/09/624,693A
CURRENT FILING DATE: 2000-07-24
NUMBER OF SEQ ID NOS: 25
SOFTWARE: Patentin Ver. 2.0
SEQ ID NO 19
LENGTH: 716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Sequence 19, Application US/09624693A Patent No. 6355468 GENERAL INFORMATION:
                                                                                                                                                                                                                               Query Match
Best Local Similarity
Matches 610; Consert
                                                                                                                                                                                                                                                                                                                                                                                                                                                 APPLICANT: Yoshida, Roberta
APPLICANT: Kootstra, Anna
TITLE OF INVENTION: Phenylalanine Ammonia Lyase Polypeptide and
TITLE OF INVENTION: Polynucleotide Sequences and Methods of Obt
TITLE OF INVENTION: Using Same
FILE REFERENCE: 29479/500NSC
                             114
                                                             121
181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     721
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      661
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    661
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       601
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       601
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         541
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        541
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          481
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        481
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         421
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         421
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     721
                                                                                               55
                                                                                                                             61
                                                                                                                                                                ш
                                                                                                                                                                                                1 MAPSLDSIATSXANGXXNGXHAAXXASXXXXXXXXXAXAGSXLPTTXXTQLDIVEXXLAD 60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                DEGILRODRYPLRTSPQWLGPLVSDMIHAHAVLSLEAGOSTTDNPLIDVENKXTHHGGNF
NSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAITGHPDSKV
                               TGFGGSADTRTEDAISLQKALLEHQLCGVLPSSFDSFRLGRGLENSLPLEVVRGAMTIRV
                                                      TGFGGSADTRTEDAISLQKALLEHQLCGVLFTSXDSFXLGRGLENSLFLEVVRGAMTIRV
                                                                                                P-TDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVT
                                                                                                                           PXTDDXXELDGYSLTLGDVVGAARKGRXVRVXDSDEIRXXIDKSVEFLRXQLXNSVYGVT
                                                                                                                                                                MAPSIDSISHSFANGVASAKQAVNGAS----TNLAVAGSHIPTTQVTQVDIVEKMLAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     LVKMLA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     LVKMLA 726
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      SSPALXYLSPRTRVLYSFVREELGVKARRGDVFLGKQEVTIGSNVSRIYBAIKSGRINXV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         SSPALXYLSPRTRVLYSFVREELGVKARRGDVFLGKQEVTIGSNVSRIYEAIKSGRINXV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       EPRWHDAFSXATGTVVEXLSSXXXXXVSLAAVNAWKVAXAEKAISLTRXVRXXFWXAPSS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         AVDLRAMEFEFKKQFXPXXXXLLXQHFGXXXTXXXXXXELXXKVXKXLXKRLEQTNSYDL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               AVDLRAMBFBFKKQFXPXXXXLLXQHFGXXXXTXXXXXXELXXKVXKXLXKRLEQTNSYDL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        AAAYTSELGHLANPVTTHVQPAEMGNQAVNSLALISARRTAEANDVLSLLLATHLYCVLQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  AAAYTSELGHLANPVTTHVQPAEMGNQAVNSLALISARRTAEANDVLSLLLATHLYCVLQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         QASAVXNTMEKTRLALALIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           QASAVXNTMEKTRLALALIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         DEGILRODRYPLRTSPOWLGPLVSDMIHAHAVLSLEAGOSTTDNPLIDVENKXTHHGGNF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            QALTALTVEAMVGHAGSFHPFLHDVTRPHPTQIEVARNIRTLLEGSXFAVHHEEEVKVKD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    QALTALTVEAMVGHAGSFHPFLHDVTRPHPTQIEVARNIRTLLEGSXFAVHHESEVKVKD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             HVXHEGXEKIMXAREAIALFGLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       EPRWHDAFSXATGTVVEXLSSXXXXXVSLAAVNAWKVAXAEKAISLTRXVRXXFWXAPSS
                                                                                                                                                                                                                                   Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       726
                                                                                                                                                                                                                                              89.8%;
                                                                                                                                                                                                                                                                                                                  toruloides
                                                                                                                                                                                                                                 25;
                                                                                                                                                                                                                                               Score 3021;
Pred. No. 0;
                                                                                                                                                                                                                                 Mismatches
                                                                                                                                                                                                                                                               DB
                                                                                                                                                                                                                                 81;
                                                                                                                                                                                                                                                               4.
                                                                                                                                                                                                                                                             Length
                                                                                                                                                                                                                               Indels
                                                                                                                                                                                                                               10;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Obtaining
                                                                                                                                                                                                                                 Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 and
                                                             180
                                                                                               113
                                                                                                                              120
                                                                                                                                                                54
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         480
 240
                                 173
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       660
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         600
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        600
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             360
                                                                                                                                                                  APPLICANT: Gatenby, Anthony
TITLE OF INVENTION: Bioproduction of para-Hydroxycinnamic Aci
FILE REFERENCE: BC1009 US NA
CURRENT APPLICATION NUMBER: US/09/627,216A
CURRENT FILLING DATE: 2000-07-27
PRIOR APPLICATION NUMBER: 60/147,719
PRIOR APPLICATION NUMBER: 60/147,719
PRIOR FILLING DATE: 1099-08
NUMBER OF SEQ ID NOS: 14
SOFTWARE: Microsoft Office 97
SEQ ID NO 8
LENGTH: 716
TYPE: PRT
ORGANISM: Rhodotorula glutinis
Ş
                             В
                                                          δÃ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    US-09-627-216A-8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 á
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                δÃ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                   US-09-627-216A-8
                                                                                               Query Match
Best Local S
Matches 610
                                                                                                                                                                                                                                                                                                                                                                                         APPLICANT: Sariaslani, S
APPLICANT: Tang, Xiao-S
APPLICANT: Oj, Wei Wei
APPLICANT: Vannelli, To
APPLICANT: Vannelli, To
                                                                                                                                                                                                                                                                                                                                                                                                                                                               Sequence 8, Application US/09627216A Patent No. 6368837 GENERAL INFORMATION:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     651
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     199
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      594
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        601
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       534
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         541
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         474
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          414
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        421
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         354
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           294
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             174
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   721
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        481
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            234
                                                                                               al Similarity
610; Conserv
 61
                                                                                                                                                                                                                                                                                                                                                                                                Tang, Xiao-Song
Qi, Wei Wei
Vannelli, Todd
                                                           MAPSLDSIATSXANGXXNGXHAAXXASXXXXXXXXXXXAXAGSXLPTTXXTQLDIVEXXLAD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     LVKMLA 726
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       SSPALXYLSPRTRVLYSFVREELGVKARRGDVFLGKQEVTIGSNVSRIYEAIKSGRINXV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          EPRWHDAFSXATGTVVEXLSSXXXXXVSLAAVNAWKVAXAEKAISLTRXVRXXFWXAPSS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              AVDLRAMEFEFKKQFXPXXXXLLXQHFGXXXTXXXXXXELXXKVXKXLXKRLEQTNSYDL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                AAAYTSELGHLANVTTTYQPAEMQNQAVNSLALISARRTAEANDVLSLLLATHLYCVLQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           DEGILRODRYPLRTSPOWLGPLVSDMIHAHAVLSLEAGQSTTDNPLIDVENKXTHHGGNF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             PXTDDXXELDGYSLTLGDVVGAARKGRXVRVXDSDEIRXKIDKSVEFLRXQLXNSVYGVT
                                 MAPSIDSISHSFANGVASAKQAVNGAS-----TNLAVAGSHIPTTQVTQVDIVEKMLAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     SSPALSYLSPRTQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        VPRWHDAFSFAAGTVVEVLSS---TSLSLAAVNAWKVAAAESAISLTRQVRETFWSAAST
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       AIDLRAIBFEFKKOFGPAIVSLIDOHFGSAMTGSNLRDELVEKVNKTLAKRLEOTNSYDL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          AAAYTSELGHLANPVTTHVQPAEMANQAVNSLALISARRTTESNDVLSLLLATHLYCVLQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          QAAAVANTMEKTRIGIAQIGKINFTQITEMINAGMNRGIPSCLAAEDPSISYHCKGIDIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        QASAVXNTMEKTRLALALIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           DEGILRODRYPLRTSPOWLGPLVSDLTHAHAVLTTEAGOSTTDNPLIDVENKTSHHGGNF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           QSLTAMTVEAMVGHAGSFHPFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEVKVKD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     QALTALTVEAMVGHAGSFHPFLHDVTRPHPTQIEVARNIRTLLEGSXFAVHHEEEVKVKD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            HVVHEGKEKILYAREAMALFNLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            HVXHEGXEKIMXAREAIALFGLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                                                                             89.8%; Score 3021; Ilarity 84.0%; Pred. No. 0; Conservative 25; Mismatches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       716
                                                                                                                                                                                                                                                                                                                                                                                                                                                     Sima
                                                                                                                                DB 4;
                                                                                                81;
                                                                                                                                  Length
                                                                                                  Indels
                                                                                                                                  716;
```

710 720 650 660 593 600 533

10;

Gaps

54

60

```
Sequence 8, Application US/09765873A

Patent No. 6521748

GENERAL INFORMATION:

APPLICANT: Tang, Xiao-Song

TITLE OF INVENTION: BIOPRODUCTION OF PARA-HYDROXYCINNAMIC ACID

FILE REFERENCE: BC1009 US CIP

CURRENT APPLICATION NUMBER: US/09/765,873A

CURRENT FILING DATE: 2001-01-19

PRIOR APPLICATION NUMBER: US 09/627,216

PRIOR FILING DATE: 2000-07-27

PRIOR FILING DATE: 2000-07-27

PRIOR APPLICATION NUMBER: US 60/147,719

PRIOR APPLICATION NUMBER: US 60/147,719

PRIOR FILING DATE: 1999-08-06

NUMBER OF SEQ ID NOS: 38

SOFTWARE: Microsoft Office 97

SEQ ID NOS: 38

LENGTH: 716

TYPE: PRI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  ğ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                              RESULT 4
US-09-765-873A-8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              ₽.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              멼
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        á
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     맑
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Б
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               B
                                                                                    US-09-765-873A-8
      Query Match
Best Local Similarity 84.0
Matches 610; Conservative
                                                                                                    ORGANISM: Rhodotorula
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          711
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              721
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    651
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          661
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                594
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    601
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          534
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              541
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    474
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        481
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              414
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                421
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      354
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              294
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          234
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     174
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              LVKMLA 726
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        SSPALXYLSPRTRVLYSFVREELGVKARRGDVFLGKQEVTIGSNVSRIYEAIKSGRINXV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              VPRWHDAFSFAAGTVVEVLSS---TSLSLAAVNAWKVAAAESAISLTROVRETFWSAAST
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            DEGILRQDRYPLRTSPQWLGPLVSDMIHAHAVLSLEAGQSTTDNPLIDVENKXTHHGGNF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              QSITAMTVEAMVGHAGSFHPFLHDVTRPHPTQIEVAGNIRKLLEGSRPAVHHEEEVKVKD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      QALTALTVEAMVGHAGSFHPFLHDVTRPHPTQIEVARNIRTLLEGSXFAVHHEEEVKVKD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              HVXHEGXEKIMXAREAIALFGLEFVVLGFKEGLGLVNGTAVSASMATLALHDAHMLSLLS 300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     NSLTRGHSAVRLVVLEALTNFLNHGITFIVFLRGTISASGDLSFLSYIAAAITGHFDSKV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     TGFGGSADTRTEDAISLQKALLEHQLCGVLPTSXDSFXLGRGLENSLPLEVVRGAMTIRV 180
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     P-TDSTLELDGYSLNIGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          LLKMLA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    SSPALSYLSPRIQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              EPRWHDAFSXATGTVVEXLSSXXXXXVSLAAVNAWKVAXAEKAISLTRXVRXXFWXAPSS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        AIDLRAIEFEFKKOFGPAIVSLIDQHFGSAMTGSNLRDELVEKVNKTLAKRLEOTNSYDL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            AVDLRAMEFEFKKOFXPXXXXLLXQHFGXXXTXXXXXXXELXXKVXXXXLXKRLEQTNSYDL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  AAAYTSELGHLANPVTTHVQPAEMANQAVNSLALISARRTTESNDVLSLLLATHLYCVLQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    AAAYTSELGHLANPVTTHVQPAEMGNQAVNSLALISARRTAEANDVLSLLLATHLYCVLQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          QAAAVANTMEKTRLGLAQIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            QASAVXNTMEKTRLALALIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIA 480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      DEGILRODRYPLRTSPOWLGPLVSDLIHAHAVLTIEAGOSTTDNPLIDVENKTSHHGGNF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        HVVHEGKEKILYAREAMALFNLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   NSLTRGHSAVRLVVLEALTNFLNHGITÞIVÞLRGTISASGDLSÞLSYIAAAISGHÞDSKV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             TGFGGSADTRTEDAISLQKALLEHQLCGVLPSSFDSFRLGRGLENSLPLEVVRGAMTIRV 173
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          716
                        89.8%; Score 3021; DB 4; 84.0%; Pred. No. 0;
                                                                                                    glutinis
          Mismatches
        81;
                                          Length 716;
        Indels
        10;
      Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    710
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              650
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  660
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        593
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            600
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  533
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          473
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      413
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              353
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        293
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   233
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     113
        w
••
APPLICANT: Sariaslani, Sima F
APPLICANT: Tang, Xiao-Song
APPLICANT: Tang, Xiao-Song
APPLICANT: Vannelli, Todd
APPLICANT: Vannelli, Todd
APPLICANT: Vannelli, Todd
APPLICANT: Gatenby, Anthony
FILE REFERENCE: BC1009 US NA
CURRENT APPLICATION NUMBER: US/09/627,216A
CURRENT PILING DATE: 2000-07-27
PRIOR APPLICATION NUMBER: 60/147,719
PRIOR APPLICATION NUMBER: 60/147,719
PRIOR FILING DATE: 1999-08-06
NUMBER OF SEQ ID NOS: 14
SOFTWARE: Microsoft Office 97
SEQ ID NO 10
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ϋ́
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ş
                                                                                                                                                                                                                                                                                                                            RESULT 5
US-09-627-216A-10
                                                                                                                                                                                                                                                                                                                                                                                                                                            Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 S
                                                                                                                                                                                                                                                                        GENERAL INFORMATION:
                                                                                                                                                                                                                                                                                      Sequence 10, Application US/09627216A
Patent No. 6368837
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    474
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              414
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  421
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      354
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    174
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              114
                                                                                                                                                                                                                                                                                                                                                                                                                                                721
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      651
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        661
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              594
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    601
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        534
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            541
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        481
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                294
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          234
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        241 HVXHEGXEKIMXAREAIALFGLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   121
                                                                                                                                                                                                                                                                                                                                                                                                          711 LLKMLA 716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ຜ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     ш
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        AVDIRAMEFEFKKQFXPXXXXILIXQHFGXXXTXXXXXXXELXXKVXKXLXKRLEQTNSYDL 600
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    QASAVXNTMEKTRLALALIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                QSLTAMTVEAMVGHAGSFHPFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEVKVKD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        NSLTRGHSAVRLVVLEALTNFLNHGITÞI VÞLRGTI SASGDLSÞLSYI AAAITGHÞDSKV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              TGFGGSADTRTEDAISLQKALLEHQLCGVLPSSFDSFRLGRGLENSLPLEVVRGAMTIRV 173
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           PXTDDXXELDGYSLTLGDVVGAARKGRXVRVXDSDEIRXKIDKSVEFLRXQLXNSVYGVT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      SSPALSYLSPRTQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                VPRWHDAFSFAAGTVVEVLSS--
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  AAAYTSELGHLANPVTTHVQPAEMANQAVNSLALISARRTTESNDVLSLLLATHLYCVLQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            AAAYTSELGHLANPVTTHVQPAEMGNQAVNSLALISARRTAEANDVLSLLLATHLYCVLQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            QAAAVANTMEKTRIGIAQIGKINFTQITEMINAGMNRGIPSCLAAEDPSISYHCKGLDIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    DEGILRODRYPLRTSPOWLGPLVSDLIHAHAVLTIEAGQSTTDNPLIDVENKTSHHGGNF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      QALTALTVEAMVGHAGSFHPFLHDVTRPHPTQIEVARNIRTLLEGSXFAVHHEEEVKVKD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          HVVHEGKEKILYARBAMALFNLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    NSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAISGHPDSKV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   MAPSIDSIATSXANGXXNGXHAAXXASXXXXXXXXXXAXAGSXLPTTXXTQLDIVEXXLAD
                                                                                                                                                                                                                                                                                                                                                                                                                                              LVKMLA 726
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                EPRWHDAFSXATGTVVEXLSSXXXXXVSLAAVNAWKVAXAEKAISLTRXVRXXFWXAPSS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      AIDLRAIEFEFKKQFGPAIVSLIDQHFGSAMTGSNLRDELVEKVNKTLAKRLEQTNSYDL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    DEGILRQDRYPLRTSPQWLGPLVSDMIHAHAVLSLEAGQSTTDNPLIDVENKXTHHGGNF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       P-IDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      SSPALXYLSPRIRVLYSFVREELGVKARRGDVFLGKQEVTIGSNVSRIYEAIKSGRINXV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     TGFGGSADTRTEDAISLQKALLEHQLCGVLPTSXDSFXLGRGLENSLPLEVVRGAMTIRV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 MAPSLDSISHSFANGVASAKQAVNGAS-----TNLAVAGSHLPTTQVTQVDIVEKMLAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                -TSLSLAAVNAWKVAAAESAISLTRQVRETFWSAAST
                                                                                                                                                            Acid
```

. 480

413

420

353 360 293

473

533 540

710

650 660 593 240

233

300

180

113 120

```
RESULT 6
US-09-765-873A-10
                                                                                                                                                              8 B
                                                                                                                                                                                                                  8 8 8
                                                                                                                                                                                                                                                                                                      망
                                                                                                                                                                                                                                                                                                                                    Ś
                                                                                                                                                                                                                                                                                                                                                                   B 8
                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                  Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                             뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          ğ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           ďΩ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                멼
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         á
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ď,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             ; OTHER INFORMA
US-09-627-216A-10
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Š
Sequence 10, Application US/0976587
PATENT NO. 6521748
GENERAL INFORMATION:
APPLICANT: Tang, Xiao-Song
TITLE OF INVENTION: BIOPRODUCTION
FILE REFERENCE: BC1009 US CIP
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Query Match
Best Local S
Matches 610
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         LENGTH: 716
TYPE: PRT
ORGANISM: Artificial Sequence
FEATURE:
OTHER INFORMATION: Description
OTHER INFORMATION: Rhodtorula c
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    hes 610;
                                                                                                                                          711
                                                                                                                                                                    721
                                                                                                                                                                                                  651
                                                                                                                                                                                                                           661
                                                                                                                                                                                                                                                       594
                                                                                                                                                                                                                                                                                  601
                                                                                                                                                                                                                                                                                                               534
                                                                                                                                                                                                                                                                                                                                         541
                                                                                                                                                                                                                                                                                                                                                                       474
                                                                                                                                                                                                                                                                                                                                                                                                 481
                                                                                                                                                                                                                                                                                                                                                                                                                            414
                                                                                                                                                                                                                                                                                                                                                                                                                                                        421
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    354
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          294
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   234
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          174
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 114
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         ហូ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              ш
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           ш
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Similarity
                                                                                                                                                                                                               SSPALXYLSPRTRYLYSFYREELGVKARRGDVFLGKQEVTIGSNVSRIYEAIKSGRINXV
                                                                                                                                                                                                                                                                           EPRWHDAFSXATGTVVEXLSSXXXXXVSLAAVNAWKVAXAEKAISLTRXVRXXFWXAPSS
                                                                                                                                                                                                                                                                                                                                                                                            AAAYTSELGHLANPVTTHVQPAEMGNQAVNSLALISARRTAEANDVLSLLLATHLYCVLQ
                                                                                                                                                                                                                                                                                                                                                                                                                                              QASAVXNTMEKTRLALALIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    DEGILRQDRYPLRTSPQWLGPLVSDLIHAHAVLTIEAGQSTTDNPLIDVENKTSHHGGNF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     DEGILRQDRYPLRTSPQWLGPLVSDMIHAHAVLSLEAGQSTTDNPLIDVENKXTHHGGNF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               QALTALTVEAMVGHAGSFHPFLHDVTRPHPTQIEVARNIRTLLEGSXFAVHHEEEVKVKD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   HVVHEGKEKILYAREAMALFNLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           NSLTRGHSAVRLVVLEALTNFLNHGITFIVPLRGTISASGDLSPLSYIAAAITGHPDSKV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               TGFGGSADTRTEDAISLQKALLEHQLCGVLPTSXDSFXLGRGLENSLPLEVVRGAMTIRV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       P-TDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         PXTDDXXELDGYSLTLGDVVGAARKGRXVRVXDSDEIRXKIDKSVEFLRXQLXNSVYGVT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              MAPSIDSISHSFANGVASAKQAVNGAS-----TNLAVAGSHLPTTQVTQVDIVEKMLAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        MAPSIDSIATSXANGXXNGXHAAXXASXXXXXXXXXXAXAGSXLPTTXXTQLDIVEXXLAD
                                                                                                                                                                       LVKMLA
                                                                                                                                                                                                  SSPALSYLSPRTQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNV
                                                                                                                                                                                                                                                         VPRWHDAFSFAAGTVVEVLSS---TSLSLAAVNAWKVAAAESAISLTRQVRETFWSAAST
                                                                                                                                                                                                                                                                                                               AIDLRATEFEFKKQFGPAIVSLIDQHFGSAMTGSNLRDELVEKVNKTLAKRLEQTNSYDL
                                                                                                                                                                                                                                                                                                                                        QAAAVANTMEKTRLGLAQIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          QSLTAMTVEAMVGHAGSFHPFLHDVTRPHPTQ1EVAGN1RKLLEGSRFAVHHEEEVKVKD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            HVXHEGXEKIMXAREAIALFGLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 TGFGGSADTRTEDAISLQKALLEHQLCGVLPSSFDSFRLGRGLENSLPLEVVRGAMTIRV
                                                                                                                                                                                                                                                                                                                                                                      AAAYTSELGHLANPVTTHVQPAEMANQAVNSLALISARRTTESNDVLSLLLATHLYCVLQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          NSLTRGHSAVRLVVLEALTNFLNHGITÞIVÞLRGTISASGDLSÞLSYIAAAISGHÞDSKV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Conservative
                                                                                                                                                                     726
                                                                                                                                            716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Description of Artificial Rhodtorula glutinis
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   89.7%; Score 3019; I
84.0%; Pred. No. 0;
tive 24; Mismatches
                                                                       US/09765873A
              OF.
                PARA-HYDROXYCINNAMIC ACID
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                DB
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Sequence:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               4.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      82;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         mutant
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       10;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         from
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Gaps
                                                                                                                                                                                                                            720
                                                                                                                                                                                                                                                                                  660
                                                                                                                                                                                                                                                                                                               593
                                                                                                                                                                                                                                                                                                                                           600
                                                                                                                                                                                                                                                                                                                                                                      533
                                                                                                                                                                                                                                                                                                                                                                                                  540
                                                                                                                                                                                                                                                                                                                                                                                                                             473
                                                                                                                                                                                                                                                                                                                                                                                                                                                        480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    413
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            353
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          233
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 173
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              180
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       113
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              54
                                                                                                                                                                                                                                                         650
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   293
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           9
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       w
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CURRENT APPLICATION NUMBER: US/09/765,873A
CURRENT FILING DATE: 2001-01-19
PRIOR APPLICATION NUMBER: US 09/627,216
PRIOR FILING DATE: 2000-07-27
PRIOR APPLICATION NUMBER: US 60/147,719
PRIOR FILING DATE: 1999-08-06
NUMBER OF SEQ ID NOS: 38
SOFTWARE: Microsoft Office 97
SEQ ID NO 10
LENGTH: 716
ORGANISM: mutant from Rhodotorula glutinis
ORGANISM: mutant from Rhodotorula glutinis
                                                                                                                                                                                                                                                                                                         S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                            Š
                                                                                                               8
                                                                                                                                       S
                                                                                                                                                                     밁
                                                                                                                                                                                          Ş
                                                                                                                                                                                                                          맑
                                                                                                                                                                                                                                                    Ş
                                                                                                                                                                                                                                                                                  맑
                                                                                                                                                                                                                                                                                                                                           В
                                                                                                                                                                                                                                                                                                                                                                 Ş
                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                                                                                         Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                        맑
                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              맑
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ş
  RESULT 7
US-09-765-873A-38
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      망
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            US-09-765-873A-10
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Query Match
Best Local (
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Matches
                                                                                                                                                                                                                                                                                     474
                                                                                                                                                                                                                                                                                                                                            414
                                                                                                                 651
                                                                                                                                          661
                                                                                                                                                                       594
                                                                                                                                                                                                  601
                                                                                                                                                                                                                            534
                                                                                                                                                                                                                                                         541
                                                                                                                                                                                                                                                                                                               481
                                                                                                                                                                                                                                                                                                                                                                       421
                                                                                                                                                                                                                                                                                                                                                                                                  354
                                                                                                                                                                                                                                                                                                                                                                                                                             361
                                                                                                                                                                                                                                                                                                                                                                                                                                                         294
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               234
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         174
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        181 NSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAITGHPDSKV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              114
                                                           711
                                                                                     721
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     ហ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     610;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                62
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         1 MAPSIDSIATSXANGXXNGXHAAXXASXXXXXXXXXXAXAGSXLPTTXXTQLDIVEXXLAD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Similarity
                                                                                                                                 EPRWHDAFSXATGTVVEXLSSXXXXXVSLAAVNAWKVAXAEKAISLTRXVRXXFWXAPSS
                                                                                                                                                                                                                                                                                                                                                                                                                      DEGILRQDRYPLRTSPQWLGPLVSDMIHAHAVLGLEAGQSTTDNPLIDVENKXTHHGGNF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               HVVHEGKEKILYAREAVALFNLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | PXTDDXXELDGYSLTLGDVVGAARKGRXVRVXDSDEIRXXIDKSVEFLRXQLXNSVYGVT
                                                                                      LVKMLA
                                                                                                                                                                          VPRWHDAFSFAAGTVVEVLSS----TSLSLAAVNAWKVAAAESAISLTRQVRETFWSAAST
                                                                                                                                                                                                                            AIDLRATEFEFKKQFGPAIVSLIDQHFGSAMTGSNLRDELVEKVNKTLAKRLEQTNSYDL
                                                                                                                                                                                                                                                         AAAYTSELGHLANPVTTHVQPAEMGNQAVNSLALISARRTAEANDVLSLLLATHLYCVLQ
                                                                                                                                                                                                                                                                                                                                                              QASAVXNTMEKTRLALIALIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIA
                                                                                                                                                                                                                                                                                                                                                                                                    DEGILRQDRYPLRTSPQWLGPLVSDLIHAHAVLTIEAGQSTTDNPLIDVENKTSHHCGNF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                             QALTALTVEAMVGHAGSFHPFLHDVTRPHPTQIEVARNIRTLLEGSXFAVHHEEEVKVKD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            HVXHEGXEKIMXAREAIALFGLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         NSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAISGHPDSKV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               TGFGGSADTRTEDAISLQKALLEHQLCGVLPSSFDSFRLGRGLENSLPLEVVRGAMTIRV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                TGFGGSADTRTEDAISLQKALLEHQLCGVLPTSXDSFXLGRGLENSLFLEVVRGAMTIRV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      P-TDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              MAPSIDSISHSFANGVASAKQAVNGAS-----TNLAVAGSHLPTTQVTQVDIVEKMLAA
                                                          LLKMLA
                                                                                                                 SSPALSYLSPRIQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNV
                                                                                                                                                                                                                                                                                    AAAYTSELGHLANPVTTHVQPAEMANQAVNSLALISARRTTESNDVLSLLLATHLYCVLQ
                                                                                                                                                                                                                                                                                                                                           QAAAVANTMEKTRIGIAQIGKINFTQITEMINAGMNRGIPSCIAAEDPSISYHCKGIDIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                         QSLTAMTVEAMVGHAGSFHPFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEVKVKD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Conservative
                                                           716
                                                                                     726
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 89.7%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Score 3019; I
Pred. No. 0;
24; Mismatches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 명
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     82;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                4
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   716;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      10;
```

533 600 593 660 650 480

353 420 413

473

300 293 360 180 173 240

233

```
GENERAL INFORMATION:

APPLICANT: Tang, Xiao-Song

TITLE OF INVENTION: BIOPRODUCTION OF PARA-HYDROXYCINNAMIC ACID

FILE REFERENCE: BC1009 US CIP

CURRENT APPLICATION NUMBER: US/09/765,873A

CURRENT FILING DATE: 2001-01-19

PRIOR APPLICATION NUMBER: US 09/627,216

PRIOR PILING DATE: 2000-07-27

PRIOR PILING DATE: US 00/627,719

PRIOR PILING DATE: US 60/147,719

PRIOR FILING DATE: US 60/147,719

PRIOR FILING DATE: 1999-08-06

NUMBER OF SEO ID NOS: 38

SOFTWARE: Microsoft Office 97

SEO ID NO 38

LENGTH: 716

TYPE: PRT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        밁
                                                                                          8
                                                                                                                                   Ŗ.
                                                                                                                                                                     δ
                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                Ş
                                                                                                                                                                                                                                                                                          B
                                                                                                                                                                                                                                                                                                                        8
                                                                                                                                                                                                                                                                                                                                                                     맑
                                                                                                                                                                                                                                                                                                                                                                                                         Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                              뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              US-09-765-873A-38
                                                        B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Query Match
Best Local Similarity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          FEATURE:
NAME/KEY: UNSURE
LOCATION: (502)...(502)
OTHER INFORMATION: X= Gly, A.
NAME/KEY: UNSURE
LOCATION: (540)...(540)
OTHER INFORMATION: X= Thr, A
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Sequence 38, Application US/09765873A Patent No. 6521748
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Matches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ORGANISM: mutant from Rhodotorula glutinis
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          174
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   609;
                                                                                                                                                                                                                                                                                          354
                                                                                                                                                                                                                                                                                                                             361
                                                                                                                                                                                                                                                                                                                                                                                                                                                234
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     114
                                                            534
                                                                                                                                                                           481
                                                                                                                                                                                                             414
                                                                                                                                                                                                                                                    421
                                                                                                                                                                                                                                                                                                                                                                     294
                                                                                                                                                                                                                                                                                                                                                                                                           301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               ы
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             MAPSIDSIATSXANGXXNGXHAAXXASXXXXXXXXXXAXAGSXIPTTXXTQIDIVEXXLAD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                        HVXHEGXEKIMXAREAIALFGLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        PXTDDXXELDGYSLTLGDVVGAARKGRXVRVXDSDEIRXKIDKSVEFLRXQLXNSVYGVT
EPRWHDAFSXATGTVVEXLSSXXXXXVSLAAVNAWKVAXAEKAISLTRXVRXXFWXAPSS
                                                                                                                                                                                                                                                                                                                                                                                               QALTALTVEAMVGHAGSFHPFLHDVTRPHPTQIEVARNIRTLLEGSXFAVHHEEEVKVKD
                                                                                                                                                                                                                                                                                                                                                                                                                                                  HVVHEGKEKILYAREAMALFNLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        NSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAISGHPDSKV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   NSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAITGHPDSKV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        MAPSIDSISHSFANGVASAKQAVNGAS-----TNLAVAGSHLPTTQVTQVDIVEKMLAA
                                                                                                                                                                 AAAYTSELGHLANPYTTHVQPAEMGNQAVNSLALISARRTAEANDVLSLLLATHLYCVLQ
                                                                                                                                                                                                                                                                                          DEGILRQDRYPLRTSPQWLGPLVSDLIHAHAVLTIEAGQSTTDNPLIDVENKTSHHGGNF
                                                                                                                                                                                                                                                                                                                             DEGILRODRYPLRTSPOWLGPLVSDMIHAHAVLSLEAGOSTTDNPLIDVENKXTHHGGNF 420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     TGFGGSADTRTEDAISLQKALLEHQLCGVLPSSFDSFRLGRGLENSLPLEVVRGAMTIRV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         TGFGGSADTRTEDAISLQKALLEHQLCGVLPTSXDSFXLGRGLENSLPLEVVRGAMTIRV 180
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                P-TDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVT
                                                            AIDLRAXEFEFKKOFGPAIVSLIDQHFGSAMTGSNLRDELVEKVNKTLAKRLEQTNSYDL
                                                                                              AVDLRAMEFEFKKOFXPXXXXXLLXQHFGXXXTXXXXXXXELXXKVXKXLXKRLEQTNSYDL
                                                                                                                                     AAAYTSELGHLANPVTTHVQPAEMANQAXNSLALISARRTTESNDVLSLLLATHLYCVLQ
                                                                                                                                                                                                               QAAAVANTMEKTRIGIAQIGKINFTQITEMINAGMNRGIPSCLAAEDPSISYHCKGIDIA
                                                                                                                                                                                                                                                    QASAVXNIMEKTRIALALIGKINFTQLTEMINAGMNRGIPSCLAAEDPSISYHCKGIDIA 480
                                                                                                                                                                                                                                                                                                                                                                     QSLTAMTVEAMVGHAGSFHPFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEVKVKD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   89.6%; Score 3014;
83.9%; Pred. No. 0;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ala,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ala,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   24; Mismatches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ser,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ser,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Thr,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       DB 4;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     83
'-
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Length 716;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Indels 10;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Gaps
                                                                                                                                                                                                               473
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       173
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    120
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 60
                                                                                                                                       533
                                                                                                                                                                           540
                                                                                                                                                                                                                                                                                            413
                                                                                                                                                                                                                                                                                                                                                                                                           360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            233
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        54
                                                                                                                                                                                                                                                                                                                                                                       353
                                                                                                                                                                                                                                                                                                                                                                                                                                                  293
                        660
                                                                                                600
```

```
Ş
                                                                                                         맑
                                                                                                                                            Š
                                                                                                                                                                                  B
                                                                                                                                                                                                                   Ş
                                                                                                                                                                                                                                                            밁
                                                                                                                                                                                                                                                                                           Š
                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                    Ś
                                                                                                                                                                                                                                                                                                                                                                                                             片
                                                                                                                                                                                                                                                                                                                                                                                                                                            8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  ; LOCATION: (198)...(198)
; OTHER INFORMATION: X= Asp, Asn, Glu, Gln
; NAME/KEY: UNSURE
; LOCATION: (540)...(540)
; OTHER INFORMATION: X= Thr, Ala, Ser, Pro, US-09-765-873A-35
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        US-09-765-873A-35
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      NUMBER OF SEQ ID NOS: 38
SOFTWARE: Microsoft Office
SEQ ID NO 35
LENGTH: 716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 GENERAL INFORMATION
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Sequence 35, Application US/09765873A Patent No. 6521748
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Matches 609;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Query Match
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             CURRENT APPLICATION NUMBER: US/09/765,873A CURRENT FILING DATE: 2001-01-19 PRIOR APPLICATION NUMBER: US 09/627,216 PRIOR FILING DATE: 2000-07-27 PRIOR APPLICATION NUMBER: US 60/147,719 PRIOR FILING DATE: 1999-08-06
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          APPLICANT: Tang, Xiao-Song
TITLE OF INVENTION: BIOPRODUCTION OF PARA-HYDROXYCINNAMIC ACID
FILE REFERENCE: BC1009 US CIP
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            FEATURE: UNSURE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               TYPE: PRT ORGANISM: mutant from
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Local
                                                                                                                                                                                                                                                            174
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  711 LLKMLA 716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          661
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               594 VPRWHDAFSFAAGTVVEVLSS----TSLSLAAVNAWKVAAAESAISLTRQVRETFWSAAST
                                     354
                                                                    361
                                                                                                             294
                                                                                                                                                301
                                                                                                                                                                                                                       241
                                                                                                                                                                                                                                                                                               181
                                                                                                                                                                                                                                                                                                                                  114
                                                                                                                                                                                                                                                                                                                                                                        121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     721 LVKMLA 726
                                                                                                                                                                                    234
                                                                                                                                                                                                                                                                                                                                                                                                             5
5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1 MAPSLDSIATSXANGXXNGXHAAXXASXXXXXXXXAXAGSXLPTTXXTQLDIVEXXLAD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Similarity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              SSPALXYLSPRTRVLYSFVREELGVKARRGDVFLGKQEVTIGSNVSRIYEAIKSGRINXV 720
                                                                                                                                            QALTALTVEAMVGHAGSFHPFLHDVTRPHPTQIEVARNIRTLLEGSXFAVHHEEEVKVKD
                                                                                                                                                                                                                     HVXHEGXEKIMXAREAIALFGLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                                                                                                                                                                                                                                            NSLTRGHSAVRLVVLEALTNFLNHXITPIVPLRGTISASGDLSPLSYIAAAISGHPDSKV
                                                                                                                                                                                                                                                                                 NSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAITGHPDSXV
                                                                                                                                                                                                                                                                                                                                    TGFGGSADTRTEDAISLQKALLEHQLCGVLPSSFDSFRLGRGLENSLPLEVVRGAMTIRV
                                                                                                                                                                                                                                                                                                                                                                TGFGGSADTRTEDAISLQKALLEHQLCGVLPTSXDSFXLGRGLENSLPLEVVRGAMTIRV 180
                                                                                                                                                                                                                                                                                                                                                                                                             P-TDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVT
                                                                                                                                                                                                                                                                                                                                                                                                                                                PXTDDXXELDGYSLTLGDVVGAARKGRXVRVXDSDEIRXKIDKSVEFLRXQLXNSVYGVT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       SSPALSYLSPRTQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNV 710
QASAVXNTMEKTRLALALIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIA
                                                                                                                                                                                    HVVHEGKEKILYAREAMALFNLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     MAPSIDSISHSFANGVASAKQAVNGAS-----TNLAVAGSHLPTTQVTQVDIVEKMLAA 54
                                                                    DEGILRODRYPLRTSPOWLGPLVSDMIHAHAVLSLEAGOSTTDNPLIDVENKXTHHGGNF
                                       DEGILRÓDRYPLRTSPQWLGPLVSDLIHAHAVLTIEAGQSTTDNPLIDVENKTSHHGGNF
                                                                                                           QSLTAMTVEAMVGHAGSFHPFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEVKVKD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             89.5%; Score 3012;
83.9%; Pred. No. 0;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Rhodotorula glutinis
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            24; Mismatches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Gly
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 DB 4;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                83;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Length 716;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                10;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Gaps
                                                                                                                                                                                                                           300
                                                                                                                                                                                                                                                                                                                                      173
                                                                                                                                                                                                                                                                                                                                                                                                                 113
                                                                                                                                                                                                                                                                                                                                                                                                                                                  120
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            60
                                                                                                               353
                                                                                                                                                    360
                                                                                                                                                                                                                                                                233
                                                                                                                                                                                                                                                                                                 240
                                         413
                                                                          420
                                                                                                                                                                                       293
```

Š

Ş

дb 8 В

밁

δ

B Ś

```
; NAME/KEY: UNSURE
; LOCATION: (181)..(181)
; OTHER IMPORMATION: X= Pro, Ala, Se
; MAME/KEY: UNSURE
; LOCATION: (235)..(235)
; OTHER IMPORMATION: X= Ala, Gly, Se
; MAME/KEY: UNSURE
; LOCATION: (540)...(540)
; OTHER IMPORMATION: X= Thr, Ala, Se
US-09-765-873A-36
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                US-09-765-873A-36
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            GENERAL INFORMATION:
APPLICANT: Tang, Xiao-Song
APPLICANT: Tang, Xiao-Song
TITLE OF INVENTION: BIOPRODUCTION OF PARA-HYDROXYCINNAMIC ACID
FILE REFERENCE: BC1009 US CIP
CURRENT FILING DATE: 2001-01-19
PRIOR APPLICATION NUMBER: US 09/627,216
PRIOR APPLICATION NUMBER: US 09/627,216
PRIOR FILING DATE: 2000-07-27
PRIOR APPLICATION NUMBER: US 60/147,719
PRIOR APPLICATION NUMBER: US 60/147,719
PRIOR APPLICATION NUMBER: US 60/147,719
PRIOR FILING DATE: 1999-08-06
NUMBER OF SEQ ID NOS: 38
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             SOFTWARE: Microsoft Office 97
SEQ ID NO 36
LENGTH: 716
                                                                                                                                                                                                                                                                        Query Match
Best Local
                                                                                                                                                                                                                                                      Matches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Sequence 36, Application Patent No. 6521748
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              LENGTH: 71
TYPE: PRT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     ORGANISM: mutant from Rhodotorula glutinis
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           FEATURE:
                                                                                                                                                                                                                                                     Local Sir
hes 608;
   181
                                                                        121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          711
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             721
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   651
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     661
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       594
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           601
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             534
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             541
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     474
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      481
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        414
                                                                                                            55
                                                                                                                                            61
                                                                                                                                                                                                                    \vdash
                                                                                                                                                                                                                                             n 89.5%;
Similarity 83.7%;
08; Conservative 24
   NSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAITGHPDSKV 240
                                                                                                                                 PXTDDXXELDGYSLILGDVVGAARKGRXVRVXDSDEIRXKIDKSVEFLRXQLXNSVYGVT 120
                                                            TGFGGSADTRTEDAISLQKALLEHQLCGVLPTSXDSFXLGRGLENSLPLEVVRGAMTIRV 180
                                                                                                                                                                              MAPSIDSISHSFANGVASAKQAVNGAS-----TNLAVAGSHLPTTQVTQVDIVEKMLAA 54
                                                                                                                                                                                                                MAPSLDSIATSXANGXXNGXHAAXXASXXXXXXXXXXAXAGSXLPTTXXTQLDIVEXXLAD
                                                                                                          P-TDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          LLKMLA 716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              LVKMLA 726
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   SSPALSYLSPRTQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    SSPALXYLSPRTRVLYSFVREELGVKARRGDVFLGKQEVTIGSNVSRIYEAIKSGRINXV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       VPRWHDAFSFAAGTVVEVLSS---TSLSLAAVNAWKVAAAESAISLTRQVRETFWSAAST
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       EPRWHDAFSXATGTVVEXLSSXXXXXVSLAAVNAWKVAXAEKAISLTRXVRXXFWXAPSS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             AVDLRAMEFEFKKQFXPXXXXXLLXQHFGXXXTXXXXXXXELXXKVXXXXLXKRLEQTNSYDL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          AAAYTSELGHLANPVTTHVQPAEMGNQAVNSLALISARRTAEANDVLSLLLATHLYCVLQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      AIDLRAXEFEFKKQFGPAIVSLIDQHFGSAMTGSNLRDELVEKVNKTLAKRLEQTNSYDL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  AAAYTSELGHLANPVTTHVQPAEMANQAVNSLALISARRTTESNDVLSLLLATHLYCVLQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   US/09765873A
                                                                                                                                                                                                                                                     24;
                                                                                                                                                                                                                                                   Score 3010; DB 4;
Pred. No. 0;
4; Mismatches 84;
                                                                                                                                                                                                                                                                                                                                            Ser,
                                                                                                                                                                                                                                                                                                                                                                                                 Ser,
                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ser,
                                                                                                                                                                                                                                                                                                                                              Pro,
                                                                                                                                                                                                                                                                                                                                                                                                 Thr,
                                                                                                                                                                                                                                                                                                                                            Gly
                                                                                                                                                                                                                                                                                                                                                                                                 Pro
                                                                                                                                                                                                                                                                                                                                                                                                                                                    Gly
                                                                                                                                                                                                                                                                                     Length 716;
                                                                                                                                                                                                                                                     Indels
                                                                                                                                                                                                                                                     10;
                                     173
                                                                                                        113
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      473
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   710
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       650
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         660
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             593
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             600
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  533
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    540
                                                                                                                                                                                                                                           Sequence 37, Application US/09765873A

Sequence 37, Application US/09765873A

Patent No. 6521748

GENERAL INFORMATION:
APPLICANT: Tang, Xiao-Song
ITITLE OF INVENTION: BIOPRODUCTION OF PARA-HYDROXYCINNAMIC ACID
FILE REFERENCE: 9C1009 US CIP
CURRENT APPLICATION NUMBER: US/09/765,873A
CURRENT FILING DATE: 2001-01-19
PRIOR APPLICATION NUMBER: US 09/627,216
PRIOR APPLICATION NUMBER: US 09/627,216
PRIOR APPLICATION NUMBER: US 09/627,719
PRIOR APPLICATION NUMBER: US 09/627,719
PRIOR FILING DATE: 1999-08-06
NUMBER OF SEQ ID NOS: 38
SOFTWARE: MICCOSOFT Office 97
SEQ ID NO 31
TYPE: PRT
TYPE: PRT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          US-09-765-873A-37; Sequence 37, Ap
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              맑
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     몽
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
 Query Match
                                                                                                    FEATURE:

NAME/KEY: UNSURE
LOCATION: (149)...(149)
OTHER INFORMATION: X= P
NAME/KEY: UNSURE
LOCATION: (202)...(202)
OTHER INFORMATION: X= V
                                     -09-765-873A-37
                                                                        NAME/KEY: UNSURE
LOCATION: (540).
                                                     OTHER INFORMATION:
                                                                                                                                                                                                                                     ORGANISM: mutant
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       651
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          661
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              594
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                601
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    534
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      541
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          474
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           481
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               414
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     354
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    174 NSLTRGHXAVRLVVLBALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAISGHPDSKV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     711
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   721
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 421
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             294
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  234
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      241 HVXHEGXEKIMXAREAIALFGLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              VPRWHDAFSFAAGTVVEVLSS---TSLSLAAVNAWKVAAAESAISLTRQVRETFWSAAST
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                EPRWHDAFSXATGTVVEXLSSXXXXXVSLAAVNAWKVAXAEKAISLTRXVRXXFWXAPSS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     LLKMLA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  LVKMLA 726
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       SSPALSYLSPRIQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        SSPALXYLSPRTRVLYSFVREELGVKARRGDVFLGKQEVTIGSNVSRIYBAIKSGRINXV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    AIDLRAXEFEFKKQFGPAIVSLIDQHFGSAMTGSNLRDELVEKVNKTLAKRLEQTNSYDL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      AVDLRAMEFEFKKOFXPXXXXLLXQHFGXXXTXXXXXXELXXKVXKXLXKRLEQTNSYDL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          AAAYTSELGHLANPVTTHVQPAEMANQAVNSLALISARRTTESNDVLSLLLATHLYCVLQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 AAAYTSELGHLANPVTTHVQPAEMGNQAVNSLALISARRTAEANDVLSLLLATHLYCVLQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               QAAAVANTMEKTRLGLAQIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           QASAVXNTMEKTRLALIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     DEGILRQDRYPLRTSPQWLGPLVSDLIHAHAVLTIEAGQSTTDNPLIDVENKTSHHGGNF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             QALTALTVEAMVGHAGSFHPFLHDVTRPHPTQIEVARNIRTLLEGSXFAVHHEEEVKVKD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  HXVHEGKEKILYAREAMALFNLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       DEGILRODRYPLRTSPOWLGPLVSDMIHAHAVLSLEAGOSTTDNPLIDVENKXTHHGGNF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             QSLTAMTVEAMVGHAGSFHPFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEVKVKD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     716
                                                                                                                                                                                                                                   from Rhodotorula
                                                                        (540)
                                                       ×
                                                                                                                                                             X= Pro,
                                                   Thr,
                                                                                                          Val,
   89.5%;
                                                     Ala,
                                                                                                                                                             Ala,
                                                                                                          Met,
   Score 3010;
                                                     Ser,
                                                                                                          Leu,
                                                                                                                                                             Ser,
                                                                                                                                                                                                                                  glutinis
                                                     Pro,
                                                                                                                                                           Thr,
                                                       GLY
                                                                                                                                                             Gly
   DB 4;
Length 716;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 473
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     413
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              650
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  660
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      593
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      600
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          533
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  293
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      233
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             353
```

В ş В S Д Ş

```
Sequence 34, Application US/09765873A
Patent No. 6521748
GENERAL INFORMATION:
APPLICANT: Tang, Xiao-Song
TITLE OF INVENTION: BIOPRODUCTION OF PARA-HYDROXYCINNAMIC ACI
PILE REFERENCE: BC1009 US CIP
CURRENT APPLICATION NUMBER: US/09/765,873A
CURRENT FILING DATE: 2001-01-19
PRIOR APPLICATION NUMBER: US 09/627,216
PRIOR FILING DATE: 2000-07-27
PRIOR APPLICATION NUMBER: US 60/147,719
PRIOR APPLICATION NUMBER: US 60/147,719
PRIOR APPLICATION NUMBER: US 60/147,719
PRIOR APPLICATION NUMBER: US 60/147,719
PRIOR APPLICATION NUMBER: US 60/147,719
PRIOR FILING DATE: 1999-08-06
NUMBER OF SEQ ID NOS: 38
SOFTWARE: Microsoft Office 97
SEQ ID NO 34
                                                                                                                                                                                                                                                  RESULT 11
US-09-765-873A-34
                                                                                                                                                                                                                                                                                                                                                                                    В
                                                                                                                                                                                                                                                                                                                                                                                                                  Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                      밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    망
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ş
                                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                                Ϋ́
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Ϋ́
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     맑
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              δÃ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Best Local Similarity 83.7 Matches 608; Conservative
                                                                                                                                                                                                                                                                                                                                                                                      651
                                                                                                                                                                                                                                                                                                                                                                                                                     661
                                                                                                                                                                                                                                                                                                                                                                                                                                                      594
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    601
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      534
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     541
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      474
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      481
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     414
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      421
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       354
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    301
                                                                                                                                                                                                                                                                                                                      711
                                                                                                                                                                                                                                                                                                                                                     721
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       294
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     234
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       174
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     114
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ប្រ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     13
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Н
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     щ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                         EPRWHDAFSXATGTVVEXLSSXXXXXVSLAAVNAWKVAXAEKAISLTRXVRXXFWXAPSS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           AVDLRAMBFEFKKQFXPXXXXLLXQHFGXXXTXXXXXXELXXKVXKXLXKRLBQTNSYDL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   DEGILRODRYPLRTSPQWLGPLVSDLIHAHAVLTIEAGQSTTDNPLIDVENKTSHHGGNF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        QALTALTVEAMVGHAGSFHPFLHDVTRPHPTQIEVARNIRTLLEGSXFAVHHEEEVKVKD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       HVXHEGXEKIMXAREAIALFGLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          NSLTRGHSAVRLVVLEALTNFLNHGITFIVPLRGTISASGDLSPLSYIAAAITGHPDSKV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   MAPSIDSIATSXANGXXNGXHAAXXASXXXXXXXXXXXAXAGSXIPTTXXTQLDIVEXXLAD
                                                                                                                                                                                                                                                                                                                                                     LVKMLA 726
                                                                                                                                                                                                                                                                                                                                                                                                                                                   VPRWHDAFSFAAGTVVEVLSS---TSLSLAAVNAWKVAAAESAISLTRQVRETFWSAAST
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    AIDLRAXEFEFKKQFGPAIVSLIDQHFGSAMTGSNLRDELVEKVNKTLAKRLEQTNSYDL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   AAAYTSELGHLANPVTTHVQPAEMANQAVNSLALISARRTTESNDVLSLLLATHLYCVLQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         AAAYTSELGHLANPVTTHVQPAEMGNQAVNSLALISARRTAEANDVLSLLLATHLYCVLQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     QAAAVANTMEKTRIGIAQIGKINFTQITEMINAGMNRGIPSCIAAEDPSISYHCKGIDIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          QASAVXNTMEKTRLALALIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       NSLTRGHSAVRLVVLEALTNFLNHGITPXVPLRGTISASGDLSPLSYIAAAISGHPDSKV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   PXTDDXXELDGYSLTLGDVVGAARKGRXVRVXDSDEIRXKIDKSVEFLRXQLXNSVYGVT
                                                                                                                                                                                                                                                                                                                      LLKMLA
                                                                                                                                                                                                                                                                                                                                                                                      SSPALSYLSPRIQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNV
                                                                                                                                                                                                                                                                                                                                                                                                                   SSPALXYLSPRIRVLYSFVREELGVKARRGDVFLGKQEVTIGSNVSRIYEAIKSGRINXV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 DEGILRQDRYPLRTSPQWLGPLVSDMIHAHAVLSLEAGQSTTDNPLIDVENKXTHHGGNF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     HVVHEGKEKILYAREAMALFNLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     TGFGGSADTRTEDAISLQKALLEHQLCGVLPSSFDXFRLGRGLENSLPLEVVRGAMTIRV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              TGFGGSADTRTEDAISLQKALLEHQLCGYLPTSXDSFXLGRGLENSLPLEVVRGAMTIRV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   QSLTAMTVEAMVGHAGSFHPFLHDVTRPHPTQIEVÄGNIRKLLEGSRFAVHHEEEVKVKD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       P-TDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    MAPSLDSISHSFANGVASAKQAVNGAS-----TNLAVAGSHLPTTQVTQVDIVEKMLAA
                                                                                                                                                                                                                                                                                                                      716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      83.7%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      24;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Pred. No. 0;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      84;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Indels
                                                                                                                                                                      ACID
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      10;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   533
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     473
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     180
                                                                                                                                                                                                                                                                                                                                                                                      710
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    660
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    593
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     600
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     413
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    233
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     173
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       113
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    54
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     293
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  ; LOCATION: (540)...(540); OTHER INFORMATION: X= US-09-765-873A-34
     RESULT
                                                                       5
                                                                                                                    밁
                                                                                                                                            S
                                                                                                                                                                                  밁
                                                                                                                                                                                                              Ş
                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                Ş
                                                                                                                                                                                                                                                                                                                    B
                                                                                                                                                                                                                                                                                                                                            5
                                                                                                                                                                                                                                                                                                                                                                               P.
                                                                                                                                                                                                                                                                                                                                                                                                                δõ
                                                                                                                                                                                                                                                                                                                                                                                                                                                   В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 20
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   맑
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Matches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Query Match
Best Local Similarity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               ORGANISM: mutant from R
FEATURE:
NAME/KEY: UNSURE
LOCATION: (126)...(126)
OTHER INFORMATION: X = G
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                NAME/KEY: UNSURE
LOCATION: (138)..(138)
OTHER INFORMATION: X= Leu,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   NAME/KEY: UNSURE
     12
                                                                                   721
                                                                                                                     651
                                                                                                                                                   661
                                                                                                                                                                                    594
                                                                                                                                                                                                                     601
                                                                                                                                                                                                                                                    534
                                                                                                                                                                                                                                                                                   541
                                                                                                                                                                                                                                                                                                                    474
                                                                                                                                                                                                                                                                                                                                                   481
                                                                                                                                                                                                                                                                                                                                                                                    414
                                                                                                                                                                                                                                                                                                                                                                                                                   421
                                                                                                                                                                                                                                                                                                                                                                                                                                                   354
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    294
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   234
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     174
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   114
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          121 TGFGGSADTRTEDAISLQKALLEHQLCGVLPTSXDSFXLGRGLENSLPLEVVRGAMTIRV 180
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    608;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    13
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1 MAPSIDSIATSXANGXXNGXHAAXXASXXXXXXXXXAXAGSXLPTTXXXTQLDIVEXXLAD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            PXTDDXXELDGYSLTLGDVVGAARKGRXVRVXDSDEIRXKIDKSVEFLRXQLXNSVYGVT 120
                                                                                    LVKMLA 726
                                                                                                                                                   SSPALXYLSPRTRVLYSFVREELGVKARRGDVFLGKQEVTIGSNVSRIYEAIKSGRINXV
                                                                                                                                                                                                            EPRWHDAFSXATGTVVEXLSSXXXXXVSLAAVNAWKVAXAEKAISLTRXVRXXFWXAPSS
                                                                                                                                                                                                                                                      AIDLRAXEFEFKKQFGPAIVSLIDQHFGSAMTGSNLRDELVEKVNKTLAKRLEQTNSYDL
                                                                                                                                                                                                                                                                                 AVDLRAMEFEFKKQFXPXXXXLLXQHFGXXXTXXXXXXELXXKVXKXLXKRLEQTNSYDL
                                                                                                                                                                                                                                                                                                                  AAAYTSELGHLANPVTTHVQPAEMANQAVNSLALISARRTTESNDVLSLLLATHLYCVLQ
                                                                                                                                                                                                                                                                                                                                           AAAYTSELGHLANPVTTHVQPAEMGNQAVNSLALISARRTAEANDVLSLLLATHLYCVLQ
                                                                                                                                                                                                                                                                                                                                                                                                                  QASAVXNTMEKTRLALALIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                             DEGILRQDRYPLRTSPQWLGPLVSDMIHAHAVLSLEAGQSTTDNPLIDVENKXTHHGGNF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    QSLTAMTVEAMVGHAGSFHPFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEVKVKD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      QALTALTVEAXVGHAGSFHPFLHDVTRPHPTQIEVARNIRTLLEGSXFAVHHEEEVKVKD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     HVVHEGKEKILYAREAMALFNLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        HVXHEGXEKIMXAREAIALFGLEFVVLGFKEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     NSLTRGHSAVRLVVLEALTNFLNHGITPIVFLRGTISASGDLSPLSYIAAAISGHPDSKV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  NSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAITGHPDSKV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     TGFGGSADTRTEXAISLQKALLEHXLCGVLPSSFDSFRLGRGLENSLPLEVVRGAMTIRV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     P-TDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     MAPSIDSISHSFANGVASAKQAVNGAS-----TNLAVAGSHLPTTQVTQVDIVEKMLAA
                                                                                                                     SSPALSYLSPRTQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNV
                                                                                                                                                                                      VPRWHDAFSFAAGTVVEVLSS---TSLSLAAVNAWKVAAAESAISLTRQVRETFWSAAST
                                                                                                                                                                                                                                                                                                                                                                                  QAAAVANTMEKTRLGLAQIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                   DEGILRODRYPLRTSPOWLGPLVSDLIHAHAVLTIEAGOSTTDNPLIDVENKTSHHGGNF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Conservative
                                                       716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   from Rhodotorula
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     89.3%; Score 3006;
83.7%; Pred. No. 0;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Thr,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Gly,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Met,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ala,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ala,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     24;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ile,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ser,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ser,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Mismatches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   glutinis
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Pro,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Val,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Thr
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Gly
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Cys
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     DB
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    84;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     4.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Length 716;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     10;
```

173

54

480

420

353 360 293 300 233

720

660 593

593

720 650 600 533 473 480 420

353

```
В
                                             5
                                                                               밁
                                                                                                         Ş
                                                                                                                                             g
G
                                                                                                                                                                              Ş
                                                                                                                                                                                                                 В
                                                                                                                                                                                                                                         Ş
                                                                                                                                                                                                                                                                               В
                                                                                                                                                                                                                                                                                                             5
                                                                                                                                                                                                                                                                                                                                                                                                                 US-09-765-873A-33
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               US-09-765-873A-33
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               NUMBER OF SEQ ID NOS: 38
SOFTWARE: Microsoft Office 97
SEQ ID NO 33
LENGTH: 716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Sequence 33, Application US/09765873A Patent No. 6521748
                                                                                                                                                                                                                                                                                                                                                                  Query Match
Best Local
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             GENERAL INFORMATION:
                                                                                                                                                                                                                                                                                                                                                   Matches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             FILE REFERENCE: BC1009 US CIP
CURRENT APPLICATION NUMBER: US/09/765,873A
CURRENT FILING DATE: 2001-01-19
PRIOR APPLICATION NUMBER: US 09/627,216
PRIOR FILING DATE: 2000-07-27
PRIOR APPLICATION NUMBER: US 60/147,719
PRIOR APPLICATION NUMBER: US 60/147,719
PRIOR FILING DATE: 1999-08-06
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            APPLICANT: Tang, Xiao-Song
TITLE OF INVENTION: BIOPRODUCTION OF PARA-HYDROXYCINNAMIC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                            NAME/KEY: UNSURE
LOCATION: (502)..(502)
OTHER INFORMATION: X=
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              NAME/KEY: UNSURE
LOCATION: (126)..(126)
OTHER INFORMATION: X= Gly,
                                                                                                                                                                                                                                                                                                                                                                                                                                 NAME/KEY: UNSURE
LOCATION: (540)..(540)
OTHER INFORMATION: X=Thr,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              NAME/KEY: UNSURE
LOCATION: (235) ... (235)
OTHER INFORMATION: X= Ala,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                OTHER INFORMATION: X= Val,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 NAME/KEY: UNSURE LOCATION: (198).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              NAME/KEY: UNSURE
LOCATION: (181)..(181)
OTHER INFORMATION: X=
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              LOCATION: (149)..(149)
OTHER INFORMATION: X= Pro,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              NAME/KEY: UNSURE LOCATION: (149).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               NAME/KEY: UNSURE LOCATION: (138)..
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              ORGANISM: mutant from
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    LENGTH: 7
TYPE: PRT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  NAME/KEY: UNSURE
LOCATION: (202)..(202)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               OTHER INFORMATION: X=
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               OTHER INFORMATION: X= Leu,
                                                                                                                                                                                                                                                                                                                                  Mac
Local c
602;
                                                                                   174
                                                                                                                  181
                                                                                                                                                   114
                   234
                                                   241
                                                                                                                                                                                  121
                                                                                                                                                                                                                   55
                                                                                                                                                                                                                                                61
                                                                                                                                                                                                                                                                                                                                                                  Similarity
                                      HVXHEGXEKIMXAREAIALFGLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS 300
                                                                                                                                                                                                                                                PXTDDXXELDGYSLTLGDVVGAARKGRXVRVXDSDEIRXKIDKSVEFLRXQLXNSVYGVT 120
                   HXVHEGKEKILYAREAMALENLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                                                                                                                                 TGFGGSADTRTEXAISLQXALLEHXLCGVLPSSFDXFRLGRGLENSLPLEVVRGAMTIRV 173
                                                                                                                                                                                TGFGGSADTRTEDAISLOKALLEHOLCGVLPTSXDSFXLGRGLENSLPLEVVRGAMTIRV 180
                                                                                                                                                                                                                                                                                 MAPSIDSISHSFANGVASAKQAVNGAS-----TNLAVAGSHLPTTQVTQVDIVEKMLAA
                                                                                                                                                                                                                                                                                                                  MAPSIDSIATSXANGXXNGXHAAXXASXXXXXXXXXXAXAGSXLPTTXXTQLDIVEXXLAD
                                                                                   NSLTRGHXAVRLVVLEALTNFLNHXITPXVPLRGTISASGDLSPLSYIAAAISGHPDSKV
                                                                                                      NSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAITGHPDSKV
                                                                                                                                                                                                               P-TDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVT
                                                                                                                                                                                                                                                                                                                                                   Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  ..(198)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ..(181)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               .. (138)
                                                                                                                                                                                                                                                                                                                                                               88.5%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Gly,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Asp,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Pro,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Rhodotorula glutinis
                                                                                                                                                                                                                                                                                                                                                                                                                                 Ala,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ala,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Met,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ala,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ala,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ser,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Gly,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Asn,
                                                                                                                                                                                                                                                                                                                                               25;
                                                                                                                                                                                                                                                                                                                                                                 Score 2978;
Pred. No. 0;
                                                                                                                                                                                                                                                                                                                                                                                                                                 Ser,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Glu,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ile,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ala,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ser,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ser,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Leu,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ser,
                                                                                                                                                                                                                                                                                                                                                   Mismatches
                                                                                                                                                                                                                                                                                                                                                                                                                                   Pro,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Val,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Thr,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Thr,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Thr,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Thr
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Сyв
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Gln
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Gly
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Сув
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Gly
                                                                                                                                                                                                                                                                                                                                                                                BG
                                                                                                                                                                                                                                                                                                                                                   , 88
                                                                                                                                                                                                                                                                                                                                                                                4.
                                                                                                                                                                                                                                                                                                                                                                                Length 716;
                                                                                                                                                                                                                                                                                                                                                   Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ACID
                                                                                                                                                                                                                                                                                                                                                   10;
                                                                                   233
                                                                                                                  240
                                                                                                                                                                                                                   113
                                                                                                                                                                                                                                                                                 54
                                                                                                                                                                                                                                                                                                                                                               APPLICANT: Tang, Xiao-Song
ITITLE OF INVENTION: BIOPRODUCTION OF PARA-HYDROXYCINNAMIC ACID
FILE REFERENCE: BC1009 US CIP
FULE REFERENCE: BC1009 US CIP
CURRENT FILING DATE: 2001-01-19
PRIOR APPLICATION NUMBER: US 09/627,216
PRIOR APPLICATION NUMBER: US 09/627,216
PRIOR FILING DATE: 2000-07-27
PRIOR APPLICATION NUMBER: US 60/147,719
PRIOR APPLICATION NUMBER: US 60/147,719
PRIOR APPLICATION NUMBER: US 60/147,719
PRIOR FILING DATE: 1999-08-06
NUMBER OF SEQ ID NOS: 38
SOFTWARE: Microsoft Office 97
SEQ ID NO 32
LENGTH: 686
                   Ş
                                                   밁
                                                                             Ś
                                                                                                                    밁
                                                                                                                                             Ş
                                                                                                                                                                                  밁
                                                                                                                                                                                                               á
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 RESULT 13
US-09-765-873A-32
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               맑
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                맑
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ş
                                                                                                                                                                                                                                                                                                                     US-09-765-873A-32
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Sequence 32, Applica Patent No. 6521748 GENERAL INFORMATION:
                                                                                                                                                                                                                                                     Matches
                                                                                                                                                                                                                                                                 Query Match
Best Local
                                                                                                                                                                                                                                                                                                                                   TYPE: PRT ORGANISM: mutant
                    217
                                                     120
                                                                                    157
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   711
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  721
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   651
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  199
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   594
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  601
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   534
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  541
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   474
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                481
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   414
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                421
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 354
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 294
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 301
                                                                                                                                                                                                                                                    595;
                                                                                                                     60
                                                                                                                                                   97
                                                                                                                                                                                                                   37
                                                                                                                                                                                                                                                                   Similarity
SASGDLSPLSYIAAAITGHPDSKVHVXHEGXEKIMXAREAIALFGLEPVVLGPKEGLGLV
                                                                                                                                                                                                                   AXAGSXLPTTXXTQLDIVEXXLADPXTDDXXELDGYSLTLGDVVGAARKGRXVRVXDSDE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   LLKMLA 716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                LVKMLA 726
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    SSPALXYLSPRTRVLYSFVREELGVKARRGDVFLGKQEVTIGSNVSRIYEAIKSGRINXV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                EPRWHDAFSXATGTVVEXLSSXXXXXVSLAAVNAWKVAXAEKAISLTRXVRXXFWXAPSS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        AVDLRAMEFEFKKQFXFXXXXXLLXQHFGXXXXXXXXXXXXLXXKVXXXXLXKRLEQINSYDL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               QASAVXNTMEKTRLALALIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 QSLTAMTVEAMVGHAGSFHPFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEVKVKD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   QALTALTVEAMVGHAGSFHPFLHDVTRPHPTQIEVARNIRTLLEGSXFAVHHEEEVKVKD
                                                     FRIGRELENSIPLEVVRGAMTIRVNSLTREHSAVRIVVLEALTNFLNHEITPIVPLRETI
                                                                                 FXLGRGLENSLPLEVVRGAMTIRVNSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTI
                                                                                                                                          IRXKIDKSVEFLRXQLXNSVYGVTTGFGGSADTRTEDAISLQKALLEHQLCGVLPTSXDS
                                                                                                                                                                                     AVAGSHLPTTQVTQVDIVEKMLAAP-TDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 SSPALSYLSPRTQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   AIDLRAIBFBFKKQFGPAIVSLIDQHFGSAMTGSNLRDBLVEKVNKTLAKRLEQTNSYDL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ADAYTSELGHLANDVTTHVQDAEMANQAXNSLALISARRTTESNDVLSLLLATHLYCVLQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      AAAYTSELGHLANPVTTHVQPAEMGNQAVNSLALISARRTAEANDVLSLLLATHLYCVLQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 QAAAVANTMEKTRIGIAQIGKINFTQLTEMINAGMNRGIPSCLAAEDPSISYHCKGLDIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                DEGILRODRYPLRTSPOWLGPLVSDLIHAHAVLTIEAGOSTTDNPLIDVENKTSHHGGNF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               DEGILRODRYPLRTSPOWLGPLYSDMIHAHAVLSLEAGOSTTDNPLIDVENKXTHHGGNF
                                                                                                                       IRSKIDKSVEFLRSQLSMSVYGVTTGFGGSADTRTEDAISLQKALLEHQLCGVLPSSFDS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Application US/09765873A
                                                                                                                                                                                                                                                     Conservative
                                                                                                                                                                                                                                                                                                                                   from
                                                                                                                                                                                                                                                                   86.2%;
                                                                                                                                                                                                                                                                                                                                     Rhodotorula glutinis
                                                                                                                                                                                                                                                     23;
                                                                                                                                                                                                                                                                   Score 2971;
Pred. No. 0;
                                                                                                                                                                                                                                                     Mismatches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     TSLSLAAVNAWKVAAAESAISLTRQVRETFWSAAST
                                                                                                                                                                                                                                                                                   DB 4;
                                                                                                                                                                                                                                                     68;
                                                                                                                                                                                                                                                                                     Length
                                                                                                                                                                                                                                                     Indels
```

4.

```
GENERAL INFORMATION:
APPLICANT: Yoshida, Roberta
APPLICANT: Kootstra, Anna
ITILE OF INVENTION: Phenylalanine Ammonia Lyase Polypeptide and
ITILE OF INVENTION: Polynucleotide Sequences and Methods of Obtain
ITILE OF INVENTION: Using Same
ITILE REFERENCE: 29479/500NSC
CURRENT APPLICATION NUMBER: US/09/624,693A
CURRENT FILING DATE: 2000-07-24
NUMBER OF SEQ ID NOS: 25
SECTIMARE: Patentin Ver. 2.0
SEQ ID NO 17
SEQ ID NO 17
SEQ ID NO 17
SEQ ID NO 17
                                                                                                    g
                                                                                                                                 Š
                                                                                                                                                                       В
Š
                                В
                                                              8
                                                                                                                                                                                                       Ś
                                                                                                                                                                                                                                                                                                            ; TYPE: PRT ; ORGANISM: Rhodotorula mucilaginosa US-09-624-693A-17
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   RESULT 14
US-09-624-693A-17
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Sequence 17, Application US/09624693A Patent No. 6355468
                                                                                                                                                                                                                                         Best Local Similarity Matches 595; Conserv
                                                                                                                                                                                                                                                                           Query Match
                                   120
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         697
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           597
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          637
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              577
   181
                                                                    121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         657
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 517
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  457
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    397
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       337
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          180
                                                                                                      60
                                                                                                                                      61
                                                                                                                                                                                                         ш
                                                                                                                        PXTDDXXELDGYSLTLGDVVGAARKGRXVRVXDSDEIRXKIDKSVEFLRXQLXNSVYGVT
                                                                                                                                                                                                     MAPSIDSIATSXANGXXNGXHAAXXASXXXXXXXXXXAXAGSXIPTTXXTQIDIVEXXIAD
NSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAITGHPDSKV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       RNIRTILLEGSXFAVHHEEEVKVKDDEGILRQDRYPLRTSPQWLGPLVSDMIHAHAVLSLE
                                TGFGGSADTRTEDAISLQKALLEHQLCGVLPTSMDGFALGRGLENSLFLEVVRGAMTIRV
                                                                                                    AGATDQIKLDGYTLTLGDVVGAARRGRSVKVADSPHIREKIDASVEFLRTQLDNSVYGVT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       QEVTIGSNVSKIYEAIKSGRINNVLLKMLA 686
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        VAAAESAISLTROVRETFWSAASTSSPALSYLSPRTOILYAFVREELGVKARRGDVFLGK
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             VAXAEKAISUTRXVRXXFWXAPSSSSPALXYLSPRTRVLYSFVREELGVKARRGDVFLGK 696
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            RDELVEKVNKTLAKRLEQTNSYDLVPRWHDAFSFAAGTVVEVLSS---TSLSLAAVNAWK
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             XXELXXKVXKXLXKRLEQTNSYDLEPRWHDAFSXATGTVVEXLSSXXXXXXVSLAAVNAWK 636
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             ARRTAEANDVLSILLATHLYCVLQAVDLRAMEFEFKKQFXPXXXXLLXQHFGXXXTXXXX
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   RGLPSCLAAEDPSLSYHCKGLDIAAAAYTSELGHLANPVTTHVQPAEMGNQAVNSLALIS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                AGOSTTONPLIDVENKTSHHGGNFQAAAVANTMEKTRLGLAQIGKLNFTQLTEMLNAGMN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           AGQSTTDNPLIDVENKXTHHGGNFQASAVXNTMEKTRLALALIGKLNFTQLTEMLNAGMN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   GNIRKLLEGSRFAVHHEEEVKVKDDEGILRQDRYPLRTSPQWLGPLVSDLIHAHAVLTIE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      NGTAVSASMATLALHDAHMLSLLSQALTALTVEAMVGHAGSFHPFLHDVTRPHPTQIEVA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      SASGDLSPLSYIAAAISGHPDSKVHVVHEGKEKILYAREAMALFNLEPVVLGPKEGLGLV
                                                                  TGFGGSADTRTEDAISLOKALLEHOLCGVLFTSXDSFXLGRGLENSLPLEVVRGAMTIRV
                                                                                                                                                                     MAPSVDSIATSVANSLSNGLHAAAAAN-GGDVHKKTAGAGSLLPTTETTQLDIVERILAD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    QEVTIGSNVSRIYEAIKSGRINXVLVKMLA 726
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             ARRITESNDVLSLLLATHLYCVLQAIDLRAIEFEFKKQFGPAIVSLIDQHFGSAMTGSNL 539
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                RGLPSCLAAEDPSLSYHCKGLDIAAAAYTSELGHLANPVTTHVQPAEMANQAVNSLALIS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     NGTAVSASMATLALHDAHMLSLLSQSLTAMTVEAMVGHAGSFHFFLHDVTRPHFTQIEVA
                                                                                                                                                                                                                                        Conservative 33; Mismatches
                                                                                                                                                                                                                                                      86.8%;
                                                                                                                                                                                                                                                        Score 2922.5;
Pred. No. 0;
                                                                                                                                                                                                                                                                           B
                                                                                                                                                                                                                                         85;
                                                                                                                                                                                                                                                                          4.
                                                                                                                                                                                                                                        Indels 13;
                                                                                                                                                                                                                                                                          Length
                                                                                                                                                                                                                                                                      713;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Obtaining
                                                                                                                                                                                                                                        Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                and
240
                                  179
                                                                  180
                                                                                                                                     120
                                                                                                    119
                                                                                                                                                                       59
                                                                                                                                                                                                       60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          656
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            596
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               576
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  456
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   396
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     299
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                479
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  419
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   359
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              516
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      239
                                                                                                                                                                                                                                        ن.
```

```
Sequence 13, Application US/09624693A

Patent No. 6355468

GENERAL INFORMATION:
APPLICANT: Yoshida, Roberta
APPLICANT: Yoshida, Roberta
APPLICANT: Yoshida, Roberta
TITLE OF INVENTION: Polynucleotide Ammonia Lyase Polypeptide and
TITLE OF INVENTION: Polynucleotide Sequences and Methods of Obtaining and
TITLE OF INVENTION: Using Same
FILE REFERENCE: 29479/500NSC
CURRENT APPLICATION NUMBER: US/09/624,693A
CURRENT FILING DATE: 2000-07-24
NUMBER OF SEQ ID NOS: 25
SOFTWARE: Patentin Ver. 2.0
SEQ ID NO 13
LENGTH: 720
밁
                      Ś
                                                               B.
                                                                                       Ś
                                                                                                                                                                                                US-09-624-693A-13
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                RESULT 15
US-09-624-693A-13
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  벙
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   맑
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  g
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                               Query Match
Best Local Similarity
Matches 563; Conserv
                                                                                                                                                                                                           LENGTH: 720
TYPE: PRT
ORGANISM: Rhodotorula graminis
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   648
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     591
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      541
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       476
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     481
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      416
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     356
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      180
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  708
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  721
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    661
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     601
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    421
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    296
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    301
61
                                                                                              1 MAPSIDSIATSXANGXXNGXHAAXXASXXXXXXXXXXXAXAGSXIPTTXXTQIDIVEXXIAD
P-TDDVVELSGYSLTVRDVVGAARKGRRVRVQNDDEIRARVDKSVDFLKAQLQNSVYGVT
                        PXTDDXXELDGYSLTLGDVVGAARKGRXVRVXDSDEIRXKIDKSVEFLRXQLXNSVYGVT
                                                               LVKMMA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  LVKMLA 726
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        SSPALXYLSPRTRVLYSFVREELGVKARRGDVFLGKQEVTIGSNVSRIYEAIKSGRINXV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       EPRWHDAFSXATGTVVEXLSSXXXXXVSLAAVNAWKVAXAEKAISLTRXVRXXFWXAPSS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         AAAYTSELGHLANPVTTHVQPAEMGNQAVNSLALISARRTAEANDVLSLLLATHLYCVLQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      MASSVGNTMEKTRLAVALMGKVSFTQLTEMLNAGMNRALPSCLAAEDPSLSYHCKGLDIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        QASAVXNTMEKTRLALALIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          HVXHEGXEKIMXAREAIALFGLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    SSPALKYLSPRTRVLYSFVREEVGVKARRGDVYLGKQEVTIGTNVSRIYEAIKSGCIAPV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  EQRWHDTFSVATGAVVEALAG---QEVSLASLNAWKVACAEKAIALTRSVRDSFWAAPSS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   AVDLRAMEFEHTKAFEPMVTELLKQHFGALAT----AEVEDKVRKSIYKRLQQNNSYDL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  AVDLRAMEFEFKKQFXPXXXXLLXQHFGXXXTXXXXXXELXXKVXKXLXKRLEQTNSYDL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    AAAYTSELGHLANPVSTHVQPAEMGNQAINSLALISARTAEANDVLSLLLATHLYCVLQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   DEGILRODRYPLRCSPOWLGPLVSDMIHAHAVLSLEAGOSTTDNPLIDLENKWTHHGGAF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              DEGILRQDRYPLRTSPQWLGPLVSDMIHAHAVLSLEAGQSTTDNPLIDVENKXTHHGGNF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    QALTALTVEAMVGHAGSFHPFLHDVTRPHPTQIEVARNIRTLLEGSKYAVHHETEVKVKD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  QALTALTVEAMVGHAGSFHPFLHDVTRPHPTQIEVARNIRTLLEGSXFAVHHEEEVKVKD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   HV--DG--KIMSAQEAIALKGLQPVVLGPKEGLGLVNGTAVSASMATLALTDAHVLSLLA
                                                                                                                                 Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  713
                                                                                                                              82.3%; Score 2770; DB 4; 77.5%; Pred. No. 4.6e-309; tive 40; Mismatches 117;
                                                                                                                                                             Length 720;
                                                                                                                               Indels
                                                                                                                               9
119
                             120
                                                               60
                                                                                                60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   660
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     590
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    600
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     535
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      475
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     415
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    355
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    3.60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     295
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    239
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     647
```

Search completed: September 9, 2004, 10:09:41 Job time : 26.5975 secs

```
Minimum DB
Maximum DB
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Database
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Post-processing: Minimum Match 0%
Maximum Match 100%
Listing first 45 summaries
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Total number of hits satisfying chosen parameters:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Scoring table:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Sequence:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Title:
Perfect score:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Run on:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             OM protein - protein search, using sw model
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Searched:
                                                                     score greater than
                                                                                             Pred. No.
                                                  <u>ب</u>
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             seq length: 0
seq length: 2000000000
                                          No. is the number of results predicted by chance to have a greater than or equal to the score of the result being printed, derived by analysis of the total score distribution.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       US-09-939-408A-21
3365
1 MAPSLDSIATSXANG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    September 9, 2004, 10:07:54; Search time 93.3859 Seconds (without alignments) 2493.103 Million cell updates/sec
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            BLOSUM62
Gapop 10.0 , Gapext 0.5
                                                                                                                                                   10:
11:
12:
13:
14:
15:
16:
17:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1335176 segs, 320689617 residues
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Published_Applications_AA:*
/cgn2_6/ptodata/2/pubpaa
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         MAPSIDSIATSXANGXXNGX......RIYEAIKSGRINXVLVKMLA 726
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GenCore version 5.1.6
Copyright (c) 1993 - 2004 Compugen Ltd.
                                                                                                                                        /cgn2_6/ptodata/2/pubpaa/US09A_PUBCOMB.pep:*
/cgn2_6/ptodata/2/pubpaa/US09A_PUBCOMB.pep:*
/cgn2_6/ptodata/2/pubpaa/US09B_PUBCOMB.pep:*
/cgn2_6/ptodata/2/pubpaa/US09C_PUBCOMB.pep:*
/cgn2_6/ptodata/2/pubpaa/US10A_PUBCOMB.pep:*
/cgn2_6/ptodata/2/pubpaa/US10B_PUBCOMB.pep:*
/cgn2_6/ptodata/2/pubpaa/US10B_PUBCOMB.pep:*
/cgn2_6/ptodata/2/pubpaa/US10C_PUBCOMB.pep:*
/cgn2_6/ptodata/2/pubpaa/US10C_NEW_PUB.pep:*
/cgn2_6/ptodata/2/pubpaa/US10C_NEW_PUB.pep:*
/cgn2_6/ptodata/2/pubpaa/US10C_NEW_PUB.pep:*
                                                                                                                                                                                                                                                                                                                                                                                                                                    1150
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          _6/ptodata/2/pubpaa/PCT
                                                                                                                                                                                                                                                                                                                                                                                                    G/ptodata/2/pubpaa/US07_NEW_PUB.pep:*
6/ptodata/2/pubpaa/PCTUS_PUBCOMB.pep:*
6/ptodata/2/pubpaa/US08_NEW_PUB.pep:*
6/ptodata/2/pubpaa/US08_PUBCOMB.pep:*
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    6/ptodata/2/pubpaa/US07_PUBCOMB.pep:*
6/ptodata/2/pubpaa/CT_NEW_PUB.pep:*
6/ptodata/2/pubpaa/US06_NEW_PUB.pep:*
6/ptodata/2/pubpaa/US06_PUBCOMB.pep:*
SUMMARIES
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1335176
```

Result No.	Score	Query Match	Length	DB	ID	Description
<u>і</u>	3223	95.8	726	ٔ و	US-09-939-408A-21	Sequence 21, App
N	3021	89.8	716	9	US-09-765-873A-8	8, 2
ω	3021	89.8	716	9	US-09-939-408A-19	19
4	3021	89.8	716	14	US-10-138-970A-4	0 4.
<sub>5</sub>	3021	89.8	716	14	US-10-188-523B-8	Sequence 8, Appli
σ	3021	89.8	716	15	US-10-374-366-2	N
7	3021		716	15	US-10-439-478-2	N
œ	3019	89.7	716	ω	US-09-765-873A-10	Sequence 10, Appl
9	3019	89.7	716	14	US-10-138-970A-24	24
10	3019	89.7	716	14	US-10-188-523B-10	10,
11	3019	89.7	716	15	US-10-374-366-4	Sequence 4, Appli
12	3016	89.6	716	15	US-10-374-366-24	_
13	3015	89.6	716	15	US-10-374-366-22	22,
14	3014	89.6	716	9	US-09-765-873A-38	38,
15	3014	89.6	716	14	US-10-138-970A-22	Sequence 22, Appl

45	44	43	42	41	40	39	38	37	36	35	34	ω	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
2978	2978	2978	2978	2997	3005	3005	3006	3006	3006	3006	3006	3010	3010	3010	3010	3010	3010	3010	3010	3011	3012	3012	3012	3012	3012	3013	3014	3014	3014
œ	œ	œ	8	9	9	9	9	89.3	9	9	9	9.	9	9.	9	9	9	9.	9.	9	9	9.	9.	9.	9.	9	9.	9	9
716	716	716	716	716	716	716	716	716	716	716	716	716	716	716	716	716	716	716	716	716	716	716	716	716	716	716	716	716	716
15	14	14	v	15	15	15	15	15	14	14	9	15	15	14	14	14	14	ø	ø	15	15	15	14	14	9	G F	5	15	14
US-10-439-478-13	US-10-188-523B-33	138-	09-765-8	0-374-366-1	-10-374-366-2	-10-374-	-10-439-478-1	10-37	8-523B-	-970A-	9-765-873A-3	10-439-478-1	US-10-439-478-16	·523B-	US-10-188-523B-36	970A-2	US-10-138-970A-20	765	US-09-765-873A-36	US-10-374-366-14	US-10-439-478-15	US-10-374-366-10	US-10-188-523B-35	-13	09-765	0-374	-10-439-478-1	0-374	-10-188
13		17	ω ·		20	<u>ი</u>	14	Sequence 18, Appl		e 18	34,	17	16	37	36	21	e 20	37,	36,	Sequence 14, Appl	15	e 10	e 35	ce 19	35,	e 8	e 18	e 16	œ

## ALIGNMENTS

RESULT 1

```
ORGANISM: Artificial Sequence;
FEATURE:
NAME/KEY: SITE
LOCATION: (12)..(719)
OTHER INFORMATION: "Xaa"means any amino acid; "Xaa"means no consensus at that
OTHER INFORMATION: Description of Artificial Sequence: Consensus of
OTHER INFORMATION: SEQ ID NOs: 13, 17, and 19
US-09-939-408A-21
  В
                                   Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             US-09-939-408A-21
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Sequence 21, Application US/C Patent No. US20020102712A1 GRNERRAL INFORMATION:
APPLICANT: Yoshida, Roberta APPLICANT: Kootstra, Anna APPLICANT: Kootstra, Anna APPLICANT: Kootstra, Anna APPLICANT: Kootstra, Anna APPLICANT:
                                                                                                                                                                                                                                                                                                                                                                                                           NUMBER OF SEQ ID NOS: 30
SOFTWARE: PatentIn Ver.
SEQ ID NO 21
LENGTH: 726
                                                                                              Matches
                                                                                                                     Query Match
Best Local :
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     PRIOR APPLICATION NUMBER: US 09/624,693
PRIOR FILING DATE: 2000-07-24
PRIOR APPLICATION NUMBER: PCT/US01/23270
PRIOR FILING DATE: 2001-07-24
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CURRENT APPLICATION NUMBER: US/09/939,408A CURRENT FILING DATE: 2001-08-24
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    APPLICANT: Kootstra, Anna
TITLE OF INVENTION: Phemylalanine Ammonia Lyase Polypeptide and
TITLE OF INVENTION: Polyprucleotide Sequences and Methods of Obtaining and
TITLE OF INVENTION: Using Same
TITLE OF INVENTION: Using Same
TITLE OF INVENTION: Using Same
                                                                                                                                                                                                                                                                                                                                                                                         TYPE: PRT
                                                                                         Local Similarity nes 726; Conserv
MAPSIDSIATSXANGXXNGXHAAXXASXXXXXXXXXXXAXAGSXLPTTXXTQLDIVEXXLAD
                                   MAPSIDSIATSXANGXXNGXHAAXXXASXXXXXXXXXXAXAGSXLPTTXXTQLDIVEXXLAD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Application US/09939408A
S20020102712A1
                                                                                         95.8%; Score 3223; I ilarity 100.0%; Pred. No. 0; Conservative 0; Mismatches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     30
                                                                                                                                                                                                                                                                                                                                                                                                                                                                 2.0
                                                                                                                                            DB
                                                                                                                                    9;
                                                                                              0
                                                                                                                                            Length 726;
                                                                                              Indels
                                                                                              0
                                                                                              Gaps
     60
                                                   60
                                                                                                 0
```

posit

```
CURRENT APPLICATION NUMBER: US/09/765,873A
CURRENT FILING DATE: 2001-01-19
PRIOR APPLICATION NUMBER: US 09/627,216
PRIOR FILING DATE: 2000-07-27
PRIOR APPLICATION NUMBER: US 60/147,719
PRIOR FILING DATE: 1999-08-06
NUMBER OF SEQ ID NOS: 38
SOFTWARE: Microsoft Office 97
SEQ ID NO 8
                                                                                                                                                                                                                                                                       RESULT 2
US-09-765-873A-8
                                                                                                                                                                                                                                                                                                                                             Š
                                                                                                                                                                                                                                                                                                                                                                       유 왕
                                                                                                                                                                                                                                                                                                                                                                                                                      В
                                                                                                                                                                                                                                                                                                                                                                                                                                                 5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               유왕
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    ďΩ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               g
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     . 19
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       S
                                                                                                                                                                                            Sequence 8, Application US/09765873A
PATENT NO. US20010053847A1
GENERAL INFORMATION:
APPLICANT: Tang, Xiao-Song
TITLE OF INVENTION: BIOPRODUCTION OF PARA-HYDROXYCINNAMIC
FILE REFERENCE: BC1009 US CIP
Query Match
                           -09-765-873A-8
                                      LENGTH: 716
TYPE: PRT
ORGANISM: Rhodotorula
                                                                                                                                                                                                                                                                                                                              721
                                                                                                                                                                                                                                                                                                                                                  721
                                                                                                                                                                                                                                                                                                                                                                              661
                                                                                                                                                                                                                                                                                                                                                                                                       661
                                                                                                                                                                                                                                                                                                                                                                                                                                 601
                                                                                                                                                                                                                                                                                                                                                                                                                                                         601
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  541
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            541
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      481
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               481
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        421
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                421
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      PXTDDXXELDGYSLTLGDVVGAARKGRXVRVXDSDEIRXKIDKSVEFLRXQLXNSVYGVT
                                                                                                                                                                                                                                                                                                                                                    LVKMLA 726
                                                                                                                                                                                                                                                                                                                                                                              SSPALXYLSPRTRVLYSFVREELGVKARRGDVFLGKQEVTIGSNVSRIYEAIKSGRINXV
                                                                                                                                                                                                                                                                                                                                                                                                 SSPALXYLSPRTRVLYSFVREELGVKARRGDVFLGKQEVTIGSNVSRIYEAIKSGRINXV
                                                                                                                                                                                                                                                                                                                                                                                                                                  EPRWHDAFSXATGTVVEXLSSXXXXXVSLAAVNAWKVAXAEKAISLTRXVRXXFWXAPSS
                                                                                                                                                                                                                                                                                                                                                                                                                                                EPRWHDAFSXATGTVVEXLSSXXXXXVSLAAVNAWKVAXAEKAISLTRXVRXXFWXAPSS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  AVDÍRAMEFEFKKQFXPXXXXLLXQHFGXXXTXXXXXXELXXKVXKXLXKRLEQTNSYDL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         AVDLRAMEFEFKKQFXPXXXXXLLXQHFGXXXTXXXXXXELXXKVXKXLXKRLEQTNSYDL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               AAAYTSELGHLANPVTTHVQPAEMGNQAVNSLALISARRTAEANDVLSLLLATHLYCVLQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         QASAVXNTMEKTRLALALIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        QASAVXNTMEKTRLALALIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          DEGILRQDRYPLRTSPQWLGPLVSDMIHAHAVLSLEAGQSTTDNPLIDVENKXTHHGGNF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          DEGILRQDRYPLRTSPQWLGPLVSDMIHAHAVLSLEAGQSTTDNPLIDVENKXTHHGGNF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            QALTALTVEAMVGHAGSFHPFLHDVTRPHPTQ1EVARN1RTLLEGSXFAVHHEEEVKVKD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              QALTALTVEAMVGHAGSFHPFLHDVTRPHPTQIEVARNIRTLLEGSXFAVHHEEEVXVKD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                HVXHEGXEKIMXAREAIALFGLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              HVXHEGXEKIMXAREAIALFGLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 NSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAITGHPDSKV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               NSLTRGHSAVRLVVLEALTNFLNHGITFIVPLRGTISASGDLSPLSYIAAAITGHPDSKV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    TGFGGSADTRTEDAISLQKALLEHQLCGVLPTSXDSFXLGRGLENSLPLEVVRGAMTIRV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      TGFGGSADTRTEDAISLQKALLEHQLCGVLPTSXDSFXLGRGLENSLPLEVVRGAMTIRV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     AAAYTSELGHLANPVTTHVQPAEMGNQAVNSLALISARRTAEANDVLSLLLATHLYCVLQ
                                                                                                                                                                                                                                                                                                                              726
                                      glutinis
    Score
  DB
  9
Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            600
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    180
                                                                                                                                                                                                                                                                                                                                                                                                       720
                                                                                                                                                                                                                                                                                                                                                                                                                                 660
                                                                                                                                                                                                                                                                                                                                                                                                                                                           660
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  600
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             180
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       120
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              120
                                                                                                                                                      US-09-939-408A-19
Sequence 19, Application US/09939408A
FALENT NO. US2022102712A1
GENERAL INFORMATION:
                                                                                                                                                                                                                                                                        S
                                                                                                                                                                                                                                                                                                    片
                                                                                                                                                                                                                                                                                                                        Ś
                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                             δ
                                                                                                                                                                                                                                                                                                                                                                                                       망
                                                                                                                                                                                                                                                                                                                                                                                                                              Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                           В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      맑
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      멍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            밁
                                                                                                                                                                                                            RESULT 3
                                                                                                                                                                                                                                                  앎
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ś
APPLICANT: Yoshida, Roberta
APPLICANT: Yoshida, Roberta
APPLICANT: Koctstra, Anna
TITLE OF INVENTION: Phenylalanine Ammonia Lyase Polypeptide and
TITLE OF INVENTION: Polymucleotide Sequences and Methods of Obtaining
TITLE OF INVENTION: Using Same
TITLE OF INVENTION: Using Same
TITLE REFERENCE: 29479/500NSCA
CURRENT APPLICATION NUMBER: US/09/939,408A
CURRENT FILING DATE: 2001-08-24
PRIOR APPLICATION NUMBER: US 09/624,693
PRIOR PILING DATE: 2000-07-24
PRIOR PILING DATE: 2000-07-24
PRIOR FILING DATE: 2001-07-24
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Matches
                                                                                                                                                                                                                                                                                                    651
                                                                                                                                                                                                                                                                                                                             661
                                                                                                                                                                                                                                                                                                                                                       594
                                                                                                                                                                                                                                                                                                                                                                              109
                                                                                                                                                                                                                                                                                                                                                                                                        534
                                                                                                                                                                                                                                                                                                                                                                                                                                 541
                                                                                                                                                                                                                                                                                                                                                                                                                                                           474
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  481
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              414
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     421
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               354
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                294
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     234
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      174
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       114
                                                                                                                                                                                                                                                  711
                                                                                                                                                                                                                                                                          721
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           55
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                610;
```

and

```
Best Local Similarity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1 MAPSIDSIATSXANGXXNGXHAAXXASXXXXXXXXXAXAGSXLPTTXXTQLDIVEXXLAD
                                              LVKMLA 726
                                                                                                                                                                                             VPRWHDAFSFAAGTVVEVLSS---TSLSLAAVNAWKVAAAESAISLTRQVRETFWSAAST
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    NSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAITGHPDSKV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     MAPSLDSISHSFANGVASAKQAVNGAS-----TNLAVAGSHLPTTQVTQVDIVEKMLAA
                                                                                                                            SSPALXYLSPRTRVLYSFVREELGVKARRGDVFLGKQEVTIGSNVSRIYEAIKSGRINXV
                                                                                                                                                                                                                                 EPRWHDAFSXATGTVVEXLSSXXXXXXVSLAAVNAWKVAXAEKAISLTRXVRXXFWXAPSS
                                                                                                                                                                                                                                                                                                                               AVDLRAMBFEFKKQFXPXXXXLLXQHFGXXXTXXXXXXELXXKVXKXLXKRLEQTNSYDL
                                                                                                                                                                                                                                                                                                                                                                                                                                         AAAYTSELGHLANPVTTHVQPAEMGNQAVNSLALISARRTAEANDVLSLLLATHLYCVLQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    QASAVXNTMEKTRLALALIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         DEGILRQDRYPLRTSPQWLGPLVSDMIHAHAVLSLEAGQSTTDNPLIDVENKXTHHGGNF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 QALTALTVEAMVGHAGSFHPFLHDVTRPHPTQIEVARNIRTLLEGSXFAVHHEEEVKVKD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    HVXHEGXEKIMXAREAIALFGLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     TGFGGSADTRTEDAISLQKALLEHQLCGVLPSSFDSFRLGRGLENSLPLEVVRGAMTIRV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 TGFGGSADTRTEDAISLQKALLEHQLCGVLPTSXDSFXLGRGLENSLPLEVVRGAMTIRV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            PXTDDXXELDGYSLTLGDVVGAARKGRXVRVXDSDEIRXKIDKSVEFLRXQLXNSVYGVT
LLKMLA
                                                                                               SSPALSYLSPRTQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNV
                                                                                                                                                                                                                                                                                             AIDLRAIEFEFKKQFGPAIVSLIDQHFGSAMTGSNLRDELVEKVNKTLAKRLEQTNSYDL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          QAAAVANTMEKTRLGLAQIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          DEGILRODRYPLRTSPOWLGPLVSDLIHAHAVLTIEAGOSTTDNPLIDVENKTSHHGGNF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        QSLTAMTVEAMVGHAGSFHPFLHDVTRPHPTQ1EVAGN1RKLLEGSRFAVHHEBEVKVKD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       HVVHEGKEKILYARBAMALFNLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       NSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAISGHPDSKV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     P-TDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Conservative
716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       84.0%;
                                                                                                                                                                                                                                                                                                                                                                                             TTHVQPAEMANQAVNSLALISARRTTESNOVLSLLLATHLYCVLQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  25;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Pred. No. 7.1e-298; 25; Mismatches 81;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  10;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Gaps
                                                                                                                                              720
                                                                                                                                                                                                                                                                                             593
                                                                                                                                                                                                                                                                                                                                                                                             533
                                                                                                                                                                                                                                                                                                                                                                                                                                              540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   120
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     54
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      60
                                                                                                                                                                                               650
                                                                                                                                                                                                                                              660
                                                                                                                                                                                                                                                                                                                                              900
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               473
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             413
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        353
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          293
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          233
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       173
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         180
```

```
RESULT 4
US-10-138-970A-4
                                                                                                                                                                                                               8
                                                                                                                                                                                                                                         Ş
                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                       Ş
                                                                                                                                                                                                                                                                                                                                     망
                                                                                                                                                                                                                                                                                                                                                              Ą
                                                                                                                                                                                                                                                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                         В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               망
                                                                                                                                                                              Š
                                                                                                                                                                                                                                                                                                                                                                                                                           Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      ; NUMBER OF SEQ ID NOS: 30
SOFTWARE: PATENTIN Ver. 2.0
; SEQ ID NO 19
; LENGTH: 716
; TYPE: PAT
ORGANISM: Rhodottorula toruloides
US-09-939-408A-19
                                              Sequence 4, Application US/10138970A Publication No. US20030079255A1 GENERAL INFORMATION:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Query Match 89.8%; Score 3021; DB 9; Length 716; Best Local Similarity 84.0%; Pred. No. 7.1e-298; Matches 610; Conservative 25; Mismatches 81; Indels 1
APPLICANT: Sariasiani, Sima
APPLICANT: Tang, Xiao-Song
APPLICANT: Qi, Wei Wei
                                                                                                                                                                                                                                                                                                                                                                                                                              481
                                                                                                                                                                                                                 651
                                                                                                                                                                                                                                            661
                                                                                                                                                                                                                                                                          594
                                                                                                                                                                                                                                                                                                        601
                                                                                                                                                                                                                                                                                                                                       534
                                                                                                                                                                                                                                                                                                                                                                  541
                                                                                                                                                                                                                                                                                                                                                                                                474
                                                                                                                                                                                                                                                                                                                                                                                                                                                         414
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         421
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       354
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         234
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    174
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                181
                                                                                                                                                      711
                                                                                                                                                                                721
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                294
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               114
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  ш
                                                                                                                                                     LLKMLA
                                                                                                                                                                                 LVKMLA 726
                                                                                                                                                                                                                                 SSPALXYLSPRTRVLYSFVREELGVKARRGDVFLGXQEVTIGSNVSRIYEAIKSGRINXV
                                                                                                                                                                                                                                                                                            EPRWHDAFSXATGTVVEXLSSXXXXXVSLAAVNAWKVAXAEKAISLTRXVRXXFWXAPSS
                                                                                                                                                                                                                                                                                                                                                          AVDLRAMEFEFKKQFXFXXXXLLXQHFGXXXTXXXXXXELXXKVXKXLXKRLEQTNSYDL
                                                                                                                                                                                                                                                                                                                                                                                                                   AAAYTSELGHLANPVTTHVQPAEMGNQAVNSLALISARRTAEANDVLSLLLATHLYCVLQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                          QASAVXNTMEKTRLALALIGKLNFTQLTEMLNAGMNRGLPSCLAABDPSLSYHCKGLDIA 480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    DEGILRQDRYPLRTSPQWLGPLVSDMIHAHAVLSLEAGQSTTDNPLIDVENKXTHHGGNF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             QALTALTVEAMVGHAGSFHPFLHDVTRPHPTQIEVARNIRTLLEGSXFAVHHEEEVKVKD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      HVXHEGXEKIMXAREAIALFGLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                                                                                                                                                                                                                                                                                                                   AIDLRAIEFEFKKOFGPAIVSLIDOHFGSAMTGSNLRDELVEKVNKTLAKRLEOTNSYDL
                                                                                                                                                                                                                                                                                                                                                                                              AAAYTSELGHLANPVTTHVQPAEMANQAVNSLALISARRTTESNDVLSLLLATHLYCVLQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                         QAAAVANTMEKTRLGLAQIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    DEGILRQDRYPLRTSPQWLGPLVSDLIHAHAVLTIEAGQSTTDNPLIDVENKTSHHGGNF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               NSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDL8PLSYIAAAISGHPDSKV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 NSLTRGHSAVRLVVLEALTNFLNHGITFIVPLRGTISASGDLSPLSYIAAAITGHPDSKV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           TGFGGSADTRTEDAISLQKALLEHQLCGVLPTSXDSFXLGRGLENSLPLEVVRGAMTIRV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            PXTDDXXELDGYSLTLGDVVGAARKGRXVRVXDSDEIRXKIDKSVEFLRXQLXNSVYGVT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              MAPSLDSISHSFANGVASAKQAVNGAS-----TNLAVAGSHLFTTQVTQVDIVEKMLAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  MAPSIDSIATSXANGXXNGXHAAXXASXXXXXXXXXAXAGSXLPTTXXTQLDIVEXXLAD
                                                                                                                                                                                                               SSPALSYLSPRTQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             QSLTAMTVEAMVGHAGSFHPFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEVKVKD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           TGFGGSADTRTEDAISLQKALLEHQLCGVLPSSFDSFRLGRGLENSLFLEVVRGAMTIRV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        P-TDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVT
                                                                                                                                                      716
                                                                                                                                                                                                                                                                          -TSLSLAAVNAWKVAAAESAISLTROVRETFWSAAST
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            10;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Gaps
                                                                                                                                                                                                                                                                                                       660
                                                                                                                                                                                                                                                                                                                                                                                              533
                                                                                                                                                                                                                                                                                                                                                                                                                           540
                                                                                                                                                                                                                                                                                                                                                                                                                                                         473
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          180
                                                                                                                                                                                                                                                                          650
                                                                                                                                                                                                                                                                                                                                   593
                                                                                                                                                                                                                                                                                                                                                                  600
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    413
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              353
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        293
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  233
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      113
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    120
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 54
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               60
```

```
; LENGTH: 716
; TYPE: PRT
; ORGANISM: C:
US-10-138-970A-4
맑
                      Ş
                                                 В
                                                                              Ş
                                                                                                              B
                                                                                                                                        5
                                                                                                                                                                             망
                                                                                                                                                                                                        δ
                                                                                                                                                                                                                                        B
                                                                                                                                                                                                                                                                5
                                                                                                                                                                                                                                                                                                    В
                                                                                                                                                                                                                                                                                                                          5
                                                                                                                                                                                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                                                                                                                                                         Ś
                                                                                                                                                                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              TITLE OF INVENTION: Methods for the Production of Tyrosine, Cinnamic Acid and Para-
TITLE OF INVENTION: hydroxycinnamic Acid
FILE REFERENCE: CL1777
CURRENT APPLICATION NUMBER: US/10/138,970A
CURRENT APPLICATION NUMBER: US/10/138,970A
CURRENT FILING DATE: 2002-07-23
NUMBER OF SEQ ID NOS: 24
SOFTWARE: Microsoft Office 97
SEQ ID NO 4
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Query Match 89.8%; Score 3021; DB 14; Best Local Similarity 84.0%; Pred. No. 7.1e-298; Matches 610; Conservative 25; Mismatches 81;
                            721
                                                        651
                                                                                      661
                                                                                                                     594
                                                                                                                                                  601
                                                                                                                                                                               534
                                                                                                                                                                                                             541
                                                                                                                                                                                                                                            474
                                                                                                                                                                                                                                                                        481
                                                                                                                                                                                                                                                                                                     414
                                                                                                                                                                                                                                                                                                                                  421
                                                                                                                                                                                                                                                                                                                                                                 354
                                                                                                                                                                                                                                                                                                                                                                                            361
                                                                                                                                                                                                                                                                                                                                                                                                                              294
                                                                                                                                                                                                                                                                                                                                                                                                                                                         301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        234
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 174
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             114
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          ប
ប
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1 MAPSIDSIATSXANGXXNGXHAAXXASXXXXXXXXXXAXAGSXLPTTXXTQLDIVEXXLAD
                                                                                                                                                                                                                                                             AAAYTSELGHLANPVTTHVQPAEMGNQAVNSLALISARRTAEANDVLSLLLATHLYCVLQ
                                                                                                                                                                                                                                                                                                    QASAVXNTMEKTRLALALIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIA
                            LVKMLA
                                                         SSPALSYLSPRIQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNV
                                                                                      SSPALXYLSPRTRVLYSFVREELGVKARRGDVFLGKQEVTIGSNVSRIYEAIKSGRINXV
                                                                                                                     VPRWHDAFSFAAGTVVEVLSS---TSLSLAAVNAWKVAAAESAISLTROVRETFWSAAST
                                                                                                                                          EPRWHDAFSXATGTVVEXLSSXXXXXVSLAAVNAWKVAXAEKAISLTRXVRXXFWXAPSS
                                                                                                                                                                                                          AVDLRAMEFEFKKQFXPXXXXLLXQHFGXXXTXXXXXXELXXKVXKXLXKRLEQTNSYDL
                                                                                                                                                                                                                                                                                                                                                               DEGILRODRYPLRTSPOWLGPLVSDMIHAHAVLSLEAGOSTTDNPLIDVENKXTHHGGNF
                                                                                                                                                                                                                                                                                                                                                                                                                              QSLTAMTVEAMVGHAGSFHPFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEVKVKD
                                                                                                                                                                                                                                                                                                                                                                                                                                              QALTALTYEAWYGHAGSFHPFLHDVTRPHPTQIEVARNIRTLLEGSXFAVHHEEEVKVKD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        HVVHEGKEKILYAREAMALFNLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        HVXHEGXEKIMXAREAIALFGLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   NSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAISGHPDSKV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     NSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAITGHPDSKV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             TGFGGSADTRTEDAISLQKALLEHQLCGVLPSSFDSFRLGRGLENSLPLEVVRGAMTIRV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             TGFGGSADTRTEDAISLQKALLEHQLCGVLPTSXDSFXLGRGLENSLPLEVVRGAMTIRV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          P-TDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     PXTDDXXELDGYSLTLGDVVGAARKGRXVRVXDSDEIRXKIDKSVEFLRXQLXNSVYGVT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  MAPSIDSISHSFANGVASAKQAVNGAS-----TNLAVAGSHIPTTQVTQVDIVEKMLAA
LLKMLA
                                                                                                                                                                               AIDLRAIEFEFKKQFGPAIVSLIDQHFGSAMTGSNLRDELVEKVNKTLAKRLEQTNSYDL
                                                                                                                                                                                                                                          AAAYTSELGHLANPVTTHVQPAEMANQAVNSLALISARRTTESNDVLSLLLATHLYCVLQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         violaceum
                            726
716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              10;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     120
                                                                                                                                                660
                                                                                                                                                                                                             600
                                                                                                                                                                                                                                          533
                                                                                                                                                                                                                                                                        540
                                                                                                                                                                                                                                                                                                       473
                                                                                                                                                                                                                                                                                                                                  480
                                                                                                                                                                                                                                                                                                                                                                                               420
                                                                                                                                                                                                                                                                                                                                                                                                                                                         360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          180
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        113
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    54
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  60
                                                         710
                                                                                                                     650
                                                                                                                                                                                                                                                                                                                                                                 413
                                                                                                                                                                                                                                                                                                                                                                                                                              353
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        293
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 233
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               173
```

RESULT 5 US-10-188-523B-8 commence 8, App

Application

US/10188523B

```
APPLICANT: Tang, Xiao-Song
ITITLS OF INVENTION: BIOPRODUCTION OF PARA-HYDROXYCINNAMIC ACI
FILE REFERENCE: BC1009 US DIVCIP
CURRENT APPLICATION NUMBER: US/10/188,523B
CURRENT FILING DATE: 2002-10-17
PRIOR APPLICATION NUMBER: US 09/627,216
PRIOR FILING DATE: 2000-07-27
PRIOR APPLICATION NUMBER: US 60/147,719
PRIOR APPLICATION NUMBER: US 60/147,719
PRIOR APPLICATION NUMBER: US 60/147,719
PRIOR FILING DATE: 1999-08-06
JUMBER OF SEQ ID NOS: 38
SOFTWARE: Microsoft Office 97
SEQ ID NO 8
                                      밁
                                                             8
                                                                                              밁
                                                                                                                        Ş
                                                                                                                                                       βď
                                                                                                                                                                           ર્
                                                                                                                                                                                                        g
                                                                                                                                                                                                                                   8
                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                             Ś
                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                     S
                                                                                                                                                                                                                                                                                                                                                                                  Db.
                                                                                                                                                                                                                                                                                                                                                                                                                 Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          US-10-188-523B-8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Publication No. US20030170834A1 GENERAL INFORMATION:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Query Match
Best Local
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Matches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     LENGTH: 716
TYPE: PRT
ORGANISM: Rhodotorula
                                        651
                                                                                                 594
                                                                                                                             601
                                                                                                                                                          534
                                                                                                                                                                                    541
                                                                                                                                                                                                                  474
                                                                                                                                                                                                                                                                         414
                                                                                                                                                                                                                                                                                                     421
                                                                                                                                                                                                                                                                                                                                                                                          294
                                                                                                                                                                                                                                                                                                                                                                                                                                                     234
                                                                                                                                                                                                                                                                                                                                                                                                                                                                               241
            721
                                                                   661
                                                                                                                                                                                                                                            481
                                                                                                                                                                                                                                                                                                                                 354
                                                                                                                                                                                                                                                                                                                                                             361
                                                                                                                                                                                                                                                                                                                                                                                                                      301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            174
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    114
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               610;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              5
5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      μ.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1 MAPSIDSIATSXANGXXNGXHAAXXASXXXXXXXXXXAXAGSXIPTTXXTQLDIVEXXLAD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Similarity 84.0%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                  HVXHEGXEKIMXAREAIALFGLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      TGFGGSADTRTEDAISLQKALLEHQLCGVLFTSXDSFXLGRGLENSLPLEVVRGAMTIRV 180
                                                                                                                                                                                                                                                                                             QASAVXNTMEKTRLALIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIA
                                                                                                                                                                                                                                                                                                                                                                                                              QALTALTVEAMVGHAGSFHPFLHDVTRPHPTQIEVARNIRTLLEGSXFAVHHEEEVKVKD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             NSLTRGHSAVRLVVLEALTNFLNHGITFIVPLRGTISASGDLSFLSYIAAAITGHPDSKV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    TGFGGSADTRTEDAISLQKALLEHQLCGVLPSSFDSFRLGRGLENSLPLEVVRGAMTIRV
            LVKMLA
                                                       SSPALXYLSPRTRVLYSFVREELGVKARRGDVFLGKQEVTIGSNVSRIYEAIKSGRINXV
                                                                                               VPRWHDAFSFAAGTVVEVLSS---TSLSLAAVNAWKVAAAESAISLTRQVRETFWSAAST
                                                                                                                      EPRWHDAFSXATGTVVEXLSSXXXXXVSLAAVNAWKVAXAEKAISLTRXVRXXFWXAPSS
                                                                                                                                                          AIDLRAIEFEFKKQFGPAIVSLIDQHFGSAMTGSNLRDELVEKVNKTLAKRLEQTNSYDL
                                                                                                                                                                           AVDLRAMEFEFKKQFXPXXXXLLXQHFGXXXTXXXXXXELXXKVXKXLKKRLEQTNSYDL
|:||||:|||||||
                                                                                                                                                                                                                  AAAYTSELGHLANFVTTHVQFAEMANQAVNSLALISARRTTESNDVLSLLLIATHLYCVLQ
                                                                                                                                                                                                                                 AAAYTSELGHLANPVTTHVQPAEMGNQAVNSLALISARRTAEANDVLSLLLATHLYCVLQ
                                                                                                                                                                                                                                                                         QAAAVANTMEKTRIGLAQIGKINFTQITEMINAGMNRGIPSCLAAEDPSLSYHCKGIDIA
                                                                                                                                                                                                                                                                                                                                 DEGILRQDRYPLRTSPQWLGPLVSDLIHAHAVLTIEAGQSTTDNPLIDVENKTSHHGGNF
                                                                                                                                                                                                                                                                                                                                                   DEGILRQDRYPLRTSPQWLGPLVSDMIHAHAVLSLEAGQSTTDNPLIDVENKXTHHGGNF
                                                                                                                                                                                                                                                                                                                                                                                           QSLTAMTVEAMVGHAGSFHPFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEVKVKD
                                                                                                                                                                                                                                                                                                                                                                                                                                                 HVVHEGKEKILYAREAMALFNLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            NSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAISGHPDSKV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             P-TDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      PXTDDXXELDGYSLTLGDVVGAARKGRXVRVXDSDEIRXKIDKSVEFLRXQLXNSVYGVT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        MAPSIDSISHSFANGVASAKQAVNGAS-----TNLAVAGSHLPTTQVTQVDIVEKMLAA 54
                                        SSPALSYLSPRTQILYAFVREE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Conservative
            726
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      glutinis
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              ; Score 3021; DB 14;
; Pred. No. 7.1e-298;
25; Mismatches 81;
                                           GVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ACID
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 10;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Gaps
                                                                     720
                                                                                                                                                                                                                   533
                                                                                                                                                                                                                                               540
                                                                                                                                                                                                                                                                            473
                                                                                                                                                                                                                                                                                                      480
                                                                                                                                                                                                                                                                                                                                    413
                                                                                                                                                                                                                                                                                                                                                                420
                                                                                                                                                                                                                                                                                                                                                                                           353
                                                                                                                                                                                                                                                                                                                                                                                                                         360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       173
                                           710
                                                                                                  650
                                                                                                                              660
                                                                                                                                                           593
                                                                                                                                                                                       600
                                                                                                                                                                                                                                                                                                                                                                                                                                                     293
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              233
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         APPLICANT: Milano, Joseph
TITLE OF INVENTION: METHOD FOR THE RECOMBINA
FILE REFERENCE: CL1794 US NA
CURRENT APPLICATION NUMBER: US/10/374,366
CURRENT FILING DATE: 2003-02-26
PRIOR APPLICATION NUMBER: 60/360,279
PRIOR FILING DATE: 2002-02-26
PRIOR FILING DATE: 2002-02-26
NUMBER OF SEQ ID NOS: 203
SOFTWARE: Patentin version 3.2
SEQ ID NO 2
SEQ ID NO 2
SEQ ID NO 2
SEQ ID NO 2
                                                  8
                                                                                                         S
                                                                                                                                          B
                                                                                                                                                                      Ś
                                                                                                                                                                                                                           δ
                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                  8
                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                               Š
                                                                                                                                                                                                                                                                                                                                                                                                      8
                                                                                                                                                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                               Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ; TYPE: PRT
; ORGANISM: Rhodosporidium glutinis
US-10-374-366-2
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  RESULT 6
US-10-374-366-2
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            밁
                        밁
                                                                                   뮍
                                                                                                                                                                                                    맑
                                                                                                                                                                                                                                                                                                                                                                              B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Sequence 2, Application US/10374366 Publication No. US20040014085A1 GENERAL INFORMATION:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Matches 610;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Query Match
Best Local
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            APPLICANT: Tang, APPLICANT: Milar
                                                       601
                                                                                    534
                                                                                                                541
                                                                                                                                              474
                                                                                                                                                                         481
                                                                                                                                                                                                     414
                                                                                                                                                                                                                                 421
                                                                                                                                                                                                                                                             354
                                                                                                                                                                                                                                                                                                                      294
                                                                                                                                                                                                                                                                                                                                                  301
                                                                                                                                                                                                                                                                                                                                                                               234
                                                                                                                                                                                                                                                                                                                                                                                                         241
                                                                                                                                                                                                                                                                                                                                                                                                                                        174
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                114
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            711
661
                           594
                                                                                                                                                                                                                                                                                          361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                  181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         55
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         99.8%;
Similarity 84.0%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            LLKMLA
SSPALXYLSPRTRVLYSFVREELGVKARRGDVFLGKQEVTIGSNVSRIYEAIKSGRINXV
                             VPRWHDAFSFAAGTVVEVLSS----TSLSLAAVNAWKVAAAESAISLTROVRETFWSAAST
                                            EPRWHDAFSXATGTVVEXLSSXXXXXVSLAAVNAWKVAXAEKAISLTRXVRXXFWXAP9S
                                                                                    AIDLRAIEFEFKKOFGPAIVSLIDQHFGSAMTGSNLRDELVEKVNKTLAKRLEQTNSYDL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Xiao-Song
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             25; Mismatches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Score 3021; DB 15;
Pred. No. 7.1e-298;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             81,
```

FOR THE RECOMBINATION OF GENETIC ELEMENTS

Indels Length 716; 10; Gaps

1 MAPSIDSIATSXANGXXNGXHAAXXASXXXXXXXXXXAXAGSXLPTTXXTQLDIVEXXLAD MAPSIDSISHSFANGVASAKQAVNGAS-----TNLAVAGSHLETTQVTQVDIVEKMLAA AVDLRAMBFEFKKQFXPXXXXLLXQHFGXXXTXXXXXXELXXKVXKXLXKRLEQTNSYDL AAAYTSELGHLANPVTTHVQPAEMGNQAVNSLALISARRTAEANDVLSLLLATHLYCVLQ QASAVXNTMEKTRLALALIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIA DBGILRQDRYPLRTSPQWLGPLVSDMIHAHAVLSLEAGQSTTDNPLIDVENKXTHHGGNF QALTALTVEAMVGHAGSFHÞFLHDVTRPHÞTQIEVARNIRTLLEGSXFAVHHEEEVKVKD HVXHEGXEXIMXAREAIALFGLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS NSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAITGHPDSKV TGFGGSADTRTEDAISLQKALLEHQLCGVLPSSFDSFRLGRGLENSLPLEVVRGAMTIRV TGFGGSADTRTEDAISLQKALLEHQLCGVLPTSXDSFXLGRGLENSLPLEVVRGAMTIRV P-TDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVT PXTDDXXELDGYSLTLGDVVGAARKGRXVRVXDSDEIRXKIDKSVEFLRXQLXNSVYGVT AAAYTSELGHLANPVTTHVQPAEMANQAVNSLALISARRTTESNDVLSULLATHLYCVLQ QAAAVANTMEKTRIGIAQIĞKINFTQITEMINAGMNRGIPSCIAAEDPSISYHCKGIDIA DEGILRODRYPLRTSPOWLGPLVSDLIHAHAVLTIEAGOSTTDNPLIDVENKTSHHGGNF QSLTAMTVEAMVGHAGSFHPFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEVKVKD HVVHEGKEKILYAREAMALFNLEPVVLGPKEGLGLVNGTAVSÅSMATLALHDAHMLSLLS 533 540 473 480 300 173 180 113 120 5 4 60 593 600 413 420 353 360 293 233 240

720

660

```
APPLICANT: E.I. du Pont de Nemours and Co.
APPLICANT: Ben-Bassat, Arie
APPLICANT: Gi, Wei Wei
APPLICANT: Sariaslani, Sima
APPLICANT: Tang, Xao-Song
APPLICANT: Tang, Xao-Song
APPLICANT: Vanelli, Todd
TITLE OF INVENTION: Microbial Conversion of Glucose to Para-Hydroxystyrene
FILE REFERENCE: CL1912
CURRENT APPLICATION NUMBER: US/10/439,478
CURRENT FILING DATE: 2003-05-16
PRIOR APPLICATION NUMBER: 60/383450
PRIOR APPLICATION NUMBER: 60/383450
PRIOR FILING DATE: 2002-05-23
NUMBER OF SEQ ID NOS: 18
SOFTWARE: Microsoft Office 97
SEQ ID NO 2
밁
                         á
                                                                  망
                                                                                               Ş
                                                                                                                                    В
                                                                                                                                                                     S
                                                                                                                                                                                                        8
                                                                                                                                                                                                                                      8
                                                                                                                                                                                                                                                                             B
                                                                                                                                                                                                                                                                                                            Š
                                                                                                                                                                                                                                                                                                                                                 g
                                                                                                                                                                                                                                                                                                                                                                              Š
                                                                                                                                                                                                                                                                                                                                                                                                                     В
                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       P.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  ; LENGTH: 716
TYPE: PRT
; ORGANISM: Rhodotorula glutinis
US-10-439-478-2
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       RESULT 7
US-10-439-478-2
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Sequence 2, Application US/10439478 Publication No. US20040018600A1 GENERAL INFORMATION:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Matches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Best Local Similarity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Query Match
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  610;
                                                                                                                                      354
                                                                                                                                                                                                                                                                             234
                                                                                                                                                                                                                                                                                                              241
                                                                                                                                                                                                                                                                                                                                                   174
                                                                                                                                                                                                                                                                                                                                                                                  181
                                                                                                                                                                                                                                                                                                                                                                                                                     114
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 651
474
                               481
                                                                  414
                                                                                                   421
                                                                                                                                                                     361
                                                                                                                                                                                                        294
                                                                                                                                                                                                                                          301
                                                                                                                                                                                                                                                                                                                                                                                                                                                        121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               711
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            721
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ហ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1 MAPSIDSIATSXANGXXNGXHAAXXASXXXXXXXXXXXAXAGSXLPTTXXTQLDIVEXXLAD
                                                                                                                                                                                                                                                                                                                                                                                                                     TGFGGSADTRTEDAISLQKALLEHQLCGVLPSSFDSFRLGRGLENSLPLEVVRGAMTIRV
                                                                                                                                                                                                                                                                                                                                                                       NSLTRGHSAVRLVVLBALTNFLNHGITPIVPLRGTISASGDLSELSYIAAAITGHEDSKV 240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             AAAYTSELGHLANPVTTHVQPAEMGNQAVNSLALISARRTAEANDVLSLLLATHLYCVLQ 540
                                                                                      QASAVXNTMEKTRLALALIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIA 480
                                                                                                                                                                  DEGILRODRYPLRTSPOWLGPLVSDMIHAHAVLSLEAGQSTTDNPLIDVENKXTHHGGNF
                                                                                                                                                                                                                                                                                                      HVXHEGXEKIMXAREAIALFGLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                                                                                                                                                                                                                                                                                                                                                                                                                         TGFGGSADTRTEDAISLQKALLEHQLCGVLPTSXDSFXLGRGLENSLPLEVVRGAMTIRV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     PXTDDXXELDGYSLTLGDVVGAARKGRXVRVXDSDEIRXKIDKSVEFLRXQLXNSVYGVT
                                                                                                                                      DEGILRQDRYPLRTSPQWLGPLVSDLIHAHAVLTIEAGQSTTDNPLIDVENKTSHHGGNF
                                                                                                                                                                                                        QSLTAMTVEAMVGHAGSFHPFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEVKVKD
                                                                                                                                                                                                                                          QALTALTVEAMVGHAGS FHPFLHDVTRPHPTQIEVARNIRTLLEGSXFAVHHEEEVKVKD
                                                                                                                                                                                                                                                                               HVVHEGKEKILYAREAMALFNLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                                                                                                                                                                                                                                                                                                                                 NSLTRGHSAVRLVVLEALTNFLNHGITFIVPLRGTISASGDLSPLSYIAAAISGHPDSKV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         P-TDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            MAPSIDSISHSFANGVASAKQAVNGAS-----TNLAVAGSHLPTTQVTQVDIVEKMLAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               LLKMLA 716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            LVKMLA 726
                                                                  QAAAVANTMEKTRLGLAQIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                89.8%; Score 3021; DB 15;
84.0%; Pred. No. 7.1e-298;
tive 25; Mismatches 81;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   716;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                10;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Gaps
                                                                                                                                                                     420
                                                                                                                                                                                                                                                                                                                                                                                                                     173
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         113
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          120
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               60
                                                                  473
                                                                                                                                      413
                                                                                                                                                                                                          353
                                                                                                                                                                                                                                          360
                                                                                                                                                                                                                                                                                                              300
                                                                                                                                                                                                                                                                                                                                                 233
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              54
                                                                                                                                                                                                                                                                             293
```

```
Sequence 10, Application US/09765873A
Patent No. US20010053847A1
GENERAL INFORMATION:
APPLICANT: Tang, Xiao-Song
TITLE OF INVENTION: BLOPRODUCTION OF PARA-HYDROXYCINNAMIC ACTIVITIE OF INVENTION: BLOPRODUCTION OF PARA-HYDROXYCINNAMIC ACTIVITIES OF STATES OF
                                                                                        밁
                                                                                                                                               Ś
                                                                                                                                                                                                          片
                                                                                                                                                                                                                                                          Š
                                                                                                                                                                                                                                                                                                                        片
                                                                                                                                                                                                                                                                                                                                                                            Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                      밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        80
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      ; LENGTH; 716
TYPE: PRT
; ORGANISM: mutant from Rhodotorula glutinis
US-09-765-873A-10
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              RESULT 8
US-09-765-873A-10
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Matches 610;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Query Match
Best Local Similarity
                                 421
                                                                                           354
                                                                                                                                               361
                                                                                                                                                                                                             294
                                                                                                                                                                                                                                                                 301
                                                                                                                                                                                                                                                                                                                        234
                                                                                                                                                                                                                                                                                                                                                                                  241
                                                                                                                                                                                                                                                                                                                                                                                                                                            174
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      651
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             661
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       594
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               601
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   534
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             541
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          114 TGFGGSADTRTEDAISLQKALLEHQLCGVLFSSFDSFRLGRGLENSLFLEVVRGAMTIRV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        711
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            721
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           55
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    1 MAPSLDSIATSXANGXXNGXHAAXXASXXXXXXXXXXAXAGSXLPTTXXTQLDIVEXXLAD
QASAVXNTMEKTRLALALIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIA
                                                                                        DEGILRQDRYPLRTSPQWLGPLVSDLIHAHAVLTIEAGQSTTDNPLIDVENKTSHHGGNF
                                                                                                                                                                                                                                                    QALTALTVEAMVGHAGSFHPFLHDVTRPHPTQIEVARNIRTLLEGSXFAVHHEEEVKVKD
                                                                                                                                                                                                                                                                                                                                                            HVXHEGXEKIMXAREAIALFGLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                                                                                                                                                                                                                                                                                                                                                                                                                            NSLTRGHSAVRLVVLEALTNFLNHGITPIVFLRGTISASGDLSPLSYIAAAISGHPDSKV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                              NSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAITGHPDSKV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  TGFGGSADTRTEDAISLQKALLEHQLCGVLPTSXDSFXLGRGLENSLPLEVVRGAMTIRV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              P-TDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               PXTDDXXELDGYSLTLGDVVGAARKGRXVRVXDSDEIRXKIDKSVEFLRXQLXNSVYGVT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                MAPSLDSISHSFANGVASAKQAVNGAS-----TNLAVAGSHLPTTQVTQVDIVEKMLAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     LLKMLA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            LVKMLA 726
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     SSPALXYLSPRTRVLYSFVREELGVKARRGDVFLGKQEVTIGSNVSRIYEAIKSGRINXV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    VPRWHDAFSFAAGTVVEVLSS---TSLSLAAVNAWKVAAAESAISLTRQVRETFWSAAST
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        EPRWHDAFSXATGTVVEXLSSXXXXXVSLAAVNAWKVAXAEKAISLTRXVRXXFWXAPSS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   AIDLRAIBFEFKKQFGFAIVSLIDQHFGSANTGSNLRDELVEKVNKTLAKRLEQTNSYDL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       AVDLRAMEFEFKKOFXPXXXXLLXQHFGXXXTXXXXXXELXXKVXXXXLXKRLEQTNSYDL
                                                                                                                                         DEGILRODRYPLRTSPQWLGPLVSDMIHAHAVLSLEAGQSTTDNPLIDVENKXTHHGGNF
                                                                                                                                                                                                                                                                                                                           HVVHEGKEKILYAREAMALFNLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      SSPALSYLSPRIQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNV
                                                                                                                                                                                                             QSLTAMTVEAMVGHAGSFHPFLHDVTRPHPTQIBVAGNIRKLLEGSRFAVHHEEEVKVKD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        89.7%; Score 3019; DB 9;
84.0%; Pred. No. 1.1e-297;
active 24; Mismatches 82;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Length 716;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          ACID
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              10;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      120
                                    480
                                                                                           413
                                                                                                                                                                                                                                                                    360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             173
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    180
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         710
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               660
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         593
                                                                                                                                                     420
                                                                                                                                                                                                             353
                                                                                                                                                                                                                                                                                                                                                                                  300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              113
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                54
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       650
                                                                                                                                                                                                                                                                                                                              293
                                                                                                                                                                                                                                                                                                                                                                                                                                            233
```

```
Sequence 24, Application US/10138970A
PUBLICATION NO. US20030079255A1
GENERAL INFORMATION:
APPLICANT: Sariasiani, Sima
APPLICANT: Tang, Xiao-song
APPLICANT: Qi, Wei Wei
APPLICANT: Qi, Wei Wei
TITLE OF INVENTION: Methods for the Production of
FILE REFERENCE: CL1777
TITLE OF INVENTION: hydroxycinnamic Acid
FILE REFERENCE: CL1777
CURRENT APPLICATION UNMBER: US/10/138,970A
CURRENT FILING DATE: 2002-07-23
NUMBER OF SEQ ID NOS: 24
SOFTWARE: Microsoft Office 97
SEQ ID NO 24
LENGTH: 716
TYPE: PRT
DROANISM: artificial sequence
FEATURE:
                      Ő
                                                       B
                                                                                    Ş
                                                                                                                  뫄
                                                                                                                                                   8
                                                                                                                                                                                       밁
                                                                                                                                                                                                               5
                                                                                                                                                                                                                                                  g
                                                                                                                                                                                                                                                                                   8
                                                                                                                                                                                                                                                                                                                         망
                                                                                                                                                                                                                                                                                                                                                     Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      RESULT 9
US-10-138-970A-24
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             유 상 유
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            망
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                             US-10-138-970A-24
                                                                                                                                                                                                                                                                                                                                                                                           Matches 610;
                                                                                                                                                                                                                                                                                                                                                                                                                        Query Match
                                                                                                                                                                                                                                                                                                                                                                                                                                                                         OTHER INFORMATION:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          FEATURE:
294
                               301
                                                              234
                                                                                                                              174
                                                                                                                                                             181
                                                                                                                                                                                              114
                                                                                                                                                                                                                             121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      534
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          711
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     721
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       661
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        594
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       601
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     541
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      474
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     414
                                                                                                                                                                                                                                                            55
                                                                                                                                                                                                                                                                                            61
                                                                                                                                                                                                                                                                                                                                                        1 MAPSIDSIATSXANGXXNGXHAAXXASXXXXXXXXXXAXAGSXLPTTXXTQIDIVEXXLAD
                                                                                                                                                                                                                                                                                                                                                                                                            Similarity
                                                                                                                                                 NSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAITGHPDSKV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        VPRWHDAFSFAAGTVVEVLSS---TSLSLAAVNAWKVAAAESAISLTRQVRETFWSAAST
                                                              HVVHEGKEXILYAREAMALFNLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                                                                      HVXHEGXEKIMXAREAIALFGLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                                                                                                                                                                                                 TGFGGSADTRTEDAISLQKALLEHQLCGVLPTSXDSFXLGRGLENSLPLEVVRGAMTIRV
                                                                                                                                                                                                                                                                                 PXTDDXXELDGYSLTLGDVVGAARKGRXVRVXDSDEIRXKIDKSVEFLRXQLXNSVYGVT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        AAAYTSELGHLANPVTTHVQPAEMGNQAVNSLALISARRTAEANDVLSLLLATHLYCVLQ
QSLTAMTVEAMVGHAGSFHPFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEVKVKD
                   QALTALTVEAMVGHAGSFHPFLHDVTRPHPTQIEVARNIRTLLEGSXFAVHHEEEVKVKD
                                                                                                                              NSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAISGHPDSKV
                                                                                                                                                                                              TGFGGSADTRTEDAISLQKALLEHQLCGVLPSSFDSFRLGRGLENSLPLEVVRGAMTIRV
                                                                                                                                                                                                                                                              P-TDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVT
                                                                                                                                                                                                                                                                                                                            MAPSIDSISHSFANGVASAKQAVNGAS-----TNLAVAGSHLPTTQVTQVDIVEKMLAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        LLKMLA 716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         LVKMLA 726
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      SSPALSYLSPRTQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             SSPALXYLSPRTRVLYSFVREELGVKARRGDVFLGKQEVTIGSNVSRIYEAIKSGRINXV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              EPRWHDAFSXATGTVVEXLSSXXXXXVSLAAVNAWKVAXAEKAISLTRXVRXXFWXAPSS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      AIDLRATEFEFKKQFGPAIVSLIDQHFGSAMTGSNLRDELVEKVNKTLAKRLEQTNSYDL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     AVDLRAMEFEFKKQFXPXXXXXLLXQHFGXXXTXXXXXXELXXKVXXXXLXKRLEQTNSYDL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      AAAYTSELGHLANPVTTHVQPAEMANQAVNSLALISARRTTESNDVLSLLLATHLYCVLQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     QAAA VANTMEKTRLGLAQIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIA
                                                                                                                                                                                                                                                                                                                                                                                           Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                          mutant from rhodotorula
                                                                                                                                                                                                                                                                                                                                                                                                            84.0%;
                                                                                                                                                                                                                                                                                                                                                                                                                        89.7%;
                                                                                                                                                                                                                                                                                                                                                                                         24;
                                                                                                                                                                                                                                                                                                                                                                                                          Score 3019;
Pred. No. 1.
                                                                                                                                                                                                                                                                                                                                                                                           Mismatches
                                                                                                                                                                                                                                                                                                                                                                                                            .1e-297
                                                                                                                                                                                                                                                                                                                                                                                                                          DB 14;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                         glutinis
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         O
H
                                                                                                                                                                                                                                                                                                                                                                                           82;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Tyrosine, Cinnamic
                                                                                                                                                                                                                                                                                                                                                                                                                          Length
                                                                                                                                                                                                                                                                                                                                                                                           Indels
                                                                                                                                                                                                                                                                                                                                                                                                                            716;
                                                                                                                                                                                                                                                                                                                                                                                           10;
                                                                                                                                                                                                                                                                                                                                                                                           Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Acid
                                                                                             300
                                                                                                                                                             240
                                                                                                                                                                                                                             180
                                                                                                                                                                                                                                                            113
                                                                                                                                                                                                                                                                                            120
                                                                                                                                                                                                                                                                                                                            54
                                                                                                                                                                                                                                                                                                                                                            60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     600
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       540
 353
                                                              293
                                                                                                                            233
                                                                                                                                                                                              173
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      650
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         660
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        593
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      533
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           and
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Para-
                                                                                                                                                                                                                                                                                                                                                                                                  APPLICANT: TAME, XIAO-SONG
APPLICANT: TAME, XIAO-SONG
TITLE OF INVENTION: BIOPRODUCTION OF PARA-HYDROXYCINNAMIC ACI
FILE REFERENCE: BC1009 US DIVCIP
CURRENT APPLICATION NUMBER: US/10/188,523B
CURRENT FILING DATE: 2002-10-17
FRIOR APPLICATION NUMBER: US 09/627,216
PRIOR APPLICATION NUMBER: US 09/627,216
PRIOR FILING DATE: 2000-07-27
PRIOR FILING DATE: 2000-07-27
PRIOR FILING DATE: 1090-08-06
NUMBER OF SEQ ID NOS: 38
SOFTWARE: Microsoft Office 97
SEQ ID NO 10
LENGTH: 716
                               B
                                                         Ś
                                                                                               B
                                                                                                                         δÃ
                                                                                                                                                           B
                                                                                                                                                                                         Š
                                                                                                                                                                                                                             В
                                                                                                                                                                                                                                                       8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       RESULT 10
US-10-188-523B-10
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       망
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ş
Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  á
                                                                                                                                                                                                                                                                                                                                                             US-10-188-523B-10
                                                                                                                                                                                                                                                                                                           Query Match
Best Local :
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Sequence 10, Application US/10188523B Publication No. US20030170834A1 GENERAL INFORMATION:
                                                                                                                                                                                                                                                                                             Matches 610;
                                                                                                                                                                                                                                                                                                                                                                        TYPE: PRT ORGANISM: Rhodotorula glutinis mutant
                                                                                                                                                                                                                                                                                                             Local Similarity
                                174
                                                              181
                                                                                               114
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     721
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           651
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         594
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        601
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         534
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       541
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        474
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       481
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        414
 241
                                                                                                                              121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          661
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     421
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        354
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     361
                                                                                                                                                             <u>ს</u>
                                                                                                                                                                                            61
                                                                                                                                                                                                                                                            1 MAPSIDSIATSXANGXXNGXHAAXXASXXXXXXXXXAXAGSXLPTTXXTQIDIVEXXLAD
                                                            NSLTRGHSAVRLVVLEALTNELNHGITFIVFLRGTISASGDLSFLSYIAAAITGHFDSKV
                                                                                                                                                                                                                             MAPSIDSISHSFANGVASAKQAVNGAS-----TNLAVAGSHLPTTQVTQVDIVEKMLAA
{\tt HVXHEGXEKIMXAREAIAL} {\tt FGLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS}
                                                                                                                     TGFGGSADTRTEDAISLQKALLEHQLCGVLPTSXDSFXLGRGLENSLPLEVVRGAMTIRV
                                                                                                                                                                                         PXTDDXXELDGYSLTLGDVVGAARKGRXVRVXDSDEIRXKIDKSVEFLRXQLXNSVYGVT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         VPRWHDAFSFAAGTVVEVLSS---TSLSLAAVNAWKVAAAESAISLTROVRETFWSAAST
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              AVDLRAMEFEFKKQFXPXXXXLLXQHFGXXXTXXXXXXELXXKVXKXLXKRLEQTNSYDL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         AAAYTSELGHLANPVTTHVQPAEMGNQAVNSLALISARRTAEANDVLSLLLATHLYCVLQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     QASAVXNTMEKTRLALALIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      DEGILRQDRYPLRTSPQWLGPLVSDLIHAHAVLTIEAGQSTTDNPLIDVENKTSHHGGNF
                                                                                               TGFGGSADTRTEDAISLQKALLEHQLCGVLPSSFDSFRLGRGLENSLPLEVVRGAMTIRV
                                                                                                                                                                 P-TDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      LVKMLA 726
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           SSPALSYLSPRIQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      SSPALXYLSPRTRVLYSFVREELGVKARRGDVFLGKQEVTIGSNVSRIYEAIKSGRINXV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        EPRWHDAFSXATGTVVEXLSSXXXXXVSLAAVNAWKVAXAEKAISLTRXVRXXFWXAPSS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       AIDLRATEFEFKKQFGPAIVSLIDQHFGSAMTGSNLRDELVEKVNKTLAKRLEQTNSYDL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        AAAYTSELGHLANPVTTHVQPAEMANQAVNSLALISARRTTESNDVLSLLLATHLYCVLQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       DEGILRQDRYPLRTSPQWLGPLVSDMIHAHAVLSLEAGQSTTDNPLIDVENKXTHHGGNF
                             NSLTRGHSAYRLVVLEALTNFLNHGITPIVÞLRGTÍSASGDLSÞLSÝÍAAAÍSGHÞDSKV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      QAAAVANTMEKTRLGLAQIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIA
                                                                                                                                                                                                                                                                                            Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            716
                                                                                                                                                                                                                                                                                            89.7%; Score 3019; DB 14;
84.0%; Pred. No. 1.1e-297;
tive 24; Mismatches 82;
                                                                                                                                                                                                                                                                                                                           Length
                                                                                                                                                                                                                                                                                               Indels
                                                                                                                                                                                                                                                                                               10;
                                                                                                  173
                                                                                                                                180
                                                                                                                                                                 113
                                                                                                                                                                                                120
                                                                                                                                                                                                                                 تا
4،
                                                                                                                                                                                                                                                                60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         473
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         480
                                                                 240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           650
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          660
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           593
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          600
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         533
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        540
                                    233
```

```
APPLICANT: THIN, XiAO-SONG
APPLICANT: MILAND, JOSEPH
TITLE OF INVENTION: METHOD FOR THE RECOMBINATION OF GENETIC ELEMENTS
FILE REPERENCE: CL1794 US WA
CURRENT APPLICATION NUMBER: US/10/374,366
CURRENT FILING DATE: 2003-02-26
PRIOR APPLICATION NUMBER: 60/360,279
PRIOR FILING DATE: 2002-02-26
NUMBER OF SEQ ID NOS: 203
SOFTWARE: Patentin version 3.2
SEQ ID NO 4
LENGTH: 716
TYPE: PRT
ORGANISM: Rhodosporidium glutinis
   8
                                          В
                                                                      Ś
                                                                                                            밁
                                                                                                                                        Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  RESULT 11
US-10-374-366-4
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   망
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ş
                                                                                                                                                                                                                                               US-10-374-366-4
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   GENERAL INFORMATION:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Sequence 4, Application US/10374366 Publication No. US20040014085A1
                                                                                                                                                                                                            Query Match
                                                                                                                                                                               hes 610;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    721
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     651
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   199
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    594
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    601
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   534
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     541
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    474
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    481
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     414
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    421
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      354
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      294
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     234
              121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    711
                                           S
                                                                           61
                                                                                                                                        ب
                                                                                                                                                                                             Similarity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    LVKMLA 726
                                                                                                                              MAPSILDSIATSXANGXXNGXHAAXXASXXXXXXXXXXXAXAGSXLPTTXXTQLDIVEXXLAD 60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         DEGIIRQDRYPIRTSPQWLGPIVSDMIHAHAVLSLEAGQSTTDNPLIDVENKXTHHGGNF 420
TGFGGSADTRTEDAISLQKALLEHQLCGVLPTSXDSFXLGRGLENSLPLEVVRGAMTIRV 180
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    LLKMLA 716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   SSPALSYLSPRIQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       SSPALXYLSPRTRVLYSFVREELGVKARRGDVFLGKQEVTIGSNVSRIYEAIKSGRINXV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    VPRWHDAFSFAAGTVVEVLSS---TSLSLAAVNAWKVAAAESAISLTRQVRETFWSAAST
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        EPRWHDAFSXATGTVVEXLSSXXXXXVSLAAVNAWKVAXAEKAISLTRXVRXXFWXAPSS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   AIDLRATEFEFKKOFGPAIVSLIDOHFGSAMTGSNLRDELVEKVNKTLAKRLEOTNSYDL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              AVDLRAMEFEFKKQFXPXXXXLLXQHFGXXXTXXXXXXXELXXKVXKXLXKRLEQTNSYDL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 AAAYTSELGHLANPVTTHVQPAEMANQAVNSLALISARRTTESNDVLSLLLATHLYCVLQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      QASAVXNTMEKTRLALALIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    DEGILRQDRYPLRTSPQWLGPLVSDL1HAHAVLT1EAGQSTTDNPLIDVENKTSHHGGNF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      QSLTAMTVEAMVGHAGSFHPFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEVKVKD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        QALTALTVEAMVGHAGSFHPFLHDVTRPHPTQIEVARNIRTLLEGSXFAVHHEEEVXVKD
                                               P-TDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVT
                                                                      PXTDDXXELDGYSLTLGDVVGAARKGRXVRVXDSDEIRXKIDKSVBFLRXQLXNSVYGVT
                                                                                                              MAPSIDSISHSFANGVASAKQAVNGAS-----TNLAVAGSHLPTTQVTQVDIVEKMLAA 54
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    AAAYTSELGHLANPVTTHVQPAEMGNQAVNSLALISARRTAEANDVLSLLLATHLYCVLQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     QAAAVANTMEKTRLGLAQIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIA
                                                                                                                                                                               Conservative
                                                                                                                                                                             89.7%; Score 3019; DB 15; Length 84.0%; Pred. No. 1.1e-297; tive 24; Mismatches 82; Indels
                                                                                                                                                                             10;
                                             113
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      660
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    360
                                                                             120
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   593
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     600
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    533
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     473
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      413
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      353
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     293
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    650
```

В

TGFGGSADTRTEDAISLQKALLEHQLCGVLPSSFDSFRLGRGLENSLPLEVVRGAMTIRV

```
Sequence 24, Application US/10374366

Publication No. US20040014085A1

GENERAL INFORMATION:
APPLICANT: Tang, Xiao-Song
APPLICANT: Tang, Xiao-Song
APPLICANT: Milano, Joseph
TITLE OF INVENTION: METHOD FOR THE RECOMBINATION OF GENETIC ELEMENTS
FILE REFERENCE: CL1794 US NA
CURRENT APPLICATION UNUMBER: US/10/374,366
CURRENT APPLICATION UNUMBER: US/10/374,366
CURRENT FILING DATE: 2003-02-26
PRIOR PILING DATE: 2003-02-26
NUMBER OF SEQ ID NOS: 203
SOCTWARE: PatentIn version 3.2
SEQ ID NO 24
LENGTH: 716
TYEE: PAT
CRGANISM: Rhodosporidium glutinis
US-10-374-356-24
B,
                           Š
                                                                  밁
                                                                                            γŞ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                RESULT 12
US-10-374-366-24
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              D.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        S
                                                                                                                                         Matches 609;
                                                                                                                                                         Query Match
Best Local Similarity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        181 NSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAITGHPDSKV 240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       721
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           651
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            661
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               594
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               601
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  534
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       474
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      481
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          414
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           421
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            354
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   294
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      234 HVVHEGKEKILYAREAMALFNLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        241 HVXHEGXEKIMXAREAIALFGLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
 S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          LVKMLA 726
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       AAAYTSELGHLANPVTTHVQPAEMGNQAVNSLALISARRTAEANDVLSLLLATHLYCVLQ 540
                                                                                                    MAPSIDSIATSXANGXXNGXHAAXXASXXXXXXXXXAXAGSXIPTTXXTQIDIVEXXLAD 60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         SSPALSYLSPRTQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   SSPALXYLSPRTRVLYSFVREELGVKARRGDVFLGKQEVTIGSNVSRIYEAIKSGRINXV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               VPRWHDAFSFAAGTVVEVLSS---TSLSLAAVNAWKVAAAESAISLTRQVRETFWSAAST
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         EPRWHDAFSXATGTVVEXLSSXXXXXVSLAAVNAWKVAXAEKAISLTRXVRXXFWXAPSS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      AVDLRAMEFEFKKQFXPXXXXLLXQHFGXXXTXXXXXXELXXKVXKXLXKRLEQTNSYDL
|:|||| |||||||
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          QAAAVANTMEKTRLGLAQIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                QASAVXNTMEKTRLALALIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIA 480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            DEGILRQDRYPLRTSPQWLGPLVSDL1HAHAVLTIEAGQSTTDNPLIDVENKTSHHGGNF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    DEGILRQDRYPLRTSPQWLGPLVSDMIHAHAVLSLEAGQSTTDNPLIDVENKXTHHGGNF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     QALTALTVEAMVGHAGSFHPFLHDVTRPHPTQIEVARNIRTLLEGSXFAVHHEBEVKVKD 360
 P-TDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVT
                             PXTDDXXELDGYSLTLGDVVGAARKGRXVRVXDSDEIRXKIDKSVEFLRXQLXNSVYGVT
                                                                MAPSLDSISHSFANGVASAKQAVNGAS-----TNLAVAGSHLPTTQVTQVDIVEKMLAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      LLKMLA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  AIDLRATEFEFKKOFGPAIVSLIDOHFGSAMTGSNLRDELVEKVNKTLAKRLEOTNSYDL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     AAAYTSELGHLANPVTTHVQPAEMANQAVNSLALISARRTTESNDVLSLLLATHLYCVLQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   QSLTAMTVEAMVGHAGSFHPFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEVKVKD
                                                                                                                                         Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      716
                                                                                                                                                        89.6%; Score 3016; DB 15; 83.9%; Pred. No. 2.3e-297;
                                                                                                                                         Mismatches
                                                                                                                                         82;
                                                                                                                                                                          Length 716;
                                                                                                                                         Indels
                                                                                                                                         10;
                                                                                                                                         Gaps
   113
                                                                      54
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       600
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             473
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                413
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   353
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 650
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   660
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    593
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         533
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         293
```

```
CURRENT APPLICATION NUMBER: US/10/374,366
CURRENT FILING DATE: 2003-02-26
PRIOR APPLICATION NUMBER: 60/360,279
PRIOR FILING DATE: 2002-02-26
NUMBER OF SEQ ID NOS: 203
SOFTWARE: Patentin version 3.2
SEQ ID NO 22
LENGTH: 716
TYPE: PRT
                                                                                                                                                                                                                                                                                                                                                                                 RESULT 13
US-10-374-366-22
US-10-374-366-22
; Sequence 22, Application US/10374366
; Publication No. US20040014085A1
; GENERAL INFORMATION:
; GENERAL INFORMATION:
                                                   Query Match
Best Local Similarity
Matches 609; Conserv
                                                                                                                                                                                                                                                                                                                          APPLICANT: Tang, Xiao-Song
APPLICANT: Milano, JOseph
TITLE OF INVENTION: METHOD FOR THE RECOMBINATION OF GENETIC ELEMENTS
FILE REFERENCE: CL1794 US NA
                                                                                                                           ORGANISM: Rhodosporidium glutinis
LO-374-366-22
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            711
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 159
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     661
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         594
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            109
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              534
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                541
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    474
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         414
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   174
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             721
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       481
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           421
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               354
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      294
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            234
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         114
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            121
MAPSIDSIATSXANGXXNGXHAAXXASXXXXXXXXXXAXAGSXLPTTXXTQLDIVEXXLAD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 AAAYTSELGHLANPVTTHVQPAEMGNQAVNSLALISARRTAEANDVLSLLLATHLYCVLQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            LLKMLA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           LVKMLA 726
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 SSPALSYLSPRTQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          SSPALXYLSPRTRVLYSFVREELGVKARRGDVFLGKQEVTIGSNVSRIYEAIKSGRINXV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       VPRWHDAFSFAAGTVVEVLSS---TSLSLAAVNAWKVAAAESAISLTRQVRETFWSAAST
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            EPRWHDAFSXATGTVVEXLSSXXXXXVSLAAVNAWKVAXAEKAISLTRXVRXXFWXAPSS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            AIDLRATEFEFKKOFGPAIVSLIDOHFGSAMTGSNLRDELVEKVNKTLAKRLEOTNSYDL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         AVDLRAMEFEFKKQFXPXXXXLLXQHFGXXXTXXXXXXELXXKVXKXLXKRLEQTNSYDL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         QAAAVANTMEKTRLGLAQIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              QASAVXNTMEKTRLALIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIA 480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               DEGILRQDRYPLRTSPQWLGPLVSDLIHAHAVLTIEAGQSTTDNPLIDVENKTSHEGGNF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   DEGILRQDRYPLRTSPQWLGPLVSDMIHAHAVLSLEAGQSTTDNPLIDVENKXTHHGGNF 420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      QSLTAMTVEAMVGHAGSFHPFLHDVTRPHPTQ1EVAGN1RKLLEGSRFAVHHEEEVKVRD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   QALTALTVEAMVGHAGSFHPFLHDVTRPHPTQIEVARNIRTLLEGSXFAVHHEEEVKVKD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            HVVHEGKEKILYAREAMALFNLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               HVXHEGXEKIMXAREAIALFGLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        NSLTRGHSAVRLVVLEALTNFLNHGITFIVPLRGTISASGDLSFLSYIAAAITGHPDSXV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           TGFGGSADTRTEDAISLQKALLEHQLCGVLPTSXDSFXLGRGLENSLPLEVVRGAMTIRV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   NSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAISGHPDSKV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        TGFGGSADTRTEDAISLQKALLEHQLCGVLPSSFDSFRLGRGLENSLPLEVVRGAMTIRV
                                                       Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            716
                                                                      89.6%;
                                                   ; Score 3015; DB 15;
; Pred. No. 2.9e-297;
24; Mismatches 83;
                                                     Indels
                                                                                       Length
                                                                                       716;
                                                     10;
                                                     Gaps
                    60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       650
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            660
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                600
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    533
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         473
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            180
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              593
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 413
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      353
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            293
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 233
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         173
                                                     ω
                                                            GENERAL INFORMATION:

APPLICANT: Tang, Xiao-Song
APPLICANT: Tang, Xiao-Song
TITLE OF INVENTION. BIOPRODUCTION OF PARA-HYDROXYCINNAMIC ACII
FILE REFERENCE: BC1009 US CIP
CURRENT APPLICATION NUMBER: US/09/765,873A
CURRENT FILING DATE: 2001-01-19
PRIOR APPLICATION NUMBER: US 09/627,216
PRIOR APPLICATION NUMBER: US 09/627,216
PRIOR FILING DATE: 2000-07-27
PRIOR APPLICATION NUMBER: US 60/147,719
PRIOR FILING DATE: 1999-08-06
NUMBER OF SEQ ID NOS: 38
SOFTWARE: Microsoft Office 97
SEQ ID NO 38
LENGTH: 716
                                                                                                                                                                                                                                                                                                                                                            US-09-765-873A-38
                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Вb
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ó
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                                          Sequence 38, Application US/09765873A Patent No. US20010053847A1
 LENGTH: 716
TYPE: PRT
ORGANISM: mutant f
FEATURE:
NAME/KEY: UNSURE
                                                                                                                                                                                                                                                                                                                                                                                                                                     711
                                                                                                                                                                                                                                                                                                                                                                                                                                                                     721
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         651
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            661
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                594
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  601
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      534
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         541
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           474
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               481
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               414
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    421
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        354
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              294
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     234
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           174
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                114
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         61
                                                                                                                                                                                                                                                                                                                                                                                                                                     LLKMLA 716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                     LVKMLA 726
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         SSPALSYLSPRTQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  EPRWHDAFSXATGTVVEXLSSXXXXXVSLAAVNAWKVAXAEKAISLTRXVRXXFWXAPSS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        HVXHEGXEKIMXARBAIALFGLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          SSPALXYLSPRIRVLYSFVREELGVKARRGDVFLGKQEVTIGSNVSRIYEAIKSGRINXV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  VPRWHDAFSFAAGTVVEVLSS---TSLSLAAVNTWKVAAAESAISLTRQVRETFWSAAST
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        QASAVXNTMEKTRLALALIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        DEGILRODRYPLRISPOWLGPLVSDMIHAHAVLSLEAGOSTTDNPLIDVENKXTHHGGNF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     HVVHEGKEKILYAREAMALFNLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           NSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSFLSYIAAAISGHPDSKV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           TGFGGSADTRTEDAISLQKALLEHQLCGVLPTSXDGFXLGRGLENSLPLEVVRGAMTIRV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      AIDLRATEFEFKKQFGPAIVSLIDQHFGSAMTGSNLRDELVEKVNKTLAKRLEQTNSYDL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         AVDLRAMEFEFKKOFXPXXXXLLXQHFGXXXTXXXXXXELXXKVXKXLXKRLEQTNSYDL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           AAAYTSELGHLANPVTTHVQPAEMANQAVNSLALISARRTTESNDVLSLLLATHLYCVLQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  AAAYTSELGHLANPVTTHVQPAEMGNQAVNSLALISARRTAEANDVLSLLLATHLYCVLQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 QAAAVANTMEKTRIGIAQIGKINFTQITEMINAGMNRGIPSCLAAEDPSISYHCKGIDIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        DEGILRODRYPLRTSPOWLGPLVSDLIHAHAVLTIBAGOSTTDNPLIDVENKTSHHGGNF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              QSLTAMTVEAMVGHAGSFHPFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEVKVKD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               QALTALTVEAMVGHAGSFHPFLHDVTRPHPTQIEVARNIRTLLEGSXFAVHHEEEVKVKD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  NSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAITGHPDSKV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                TGFGGSADTRTEDAISLQKALLEHQLCGVLPSSFDSFRLGRGLENSLPLEVVRGAMTIRV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        P-TDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       PXTDDXXELDGYSLTLGDVVGAARKGRXVRVXDSDEIRXKIDKSVEFLRXQLXNSVYGVT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             MAPSLDSISHSFANGVASAKQAVNGAS-----TNLAVAGSHLPTTQVTQVDIVEKMLAA
                                      from
                                    Rhodotorula glutinis
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    660
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         600
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             533
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 473
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                173
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    180
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             710
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  65C
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      593
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          413
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              353
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     293
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           233
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               54
```

45 45 45 45

γQ 망 5 В 8 90 Ş 음 성 Вþ 8 В 5 ф VQ. В \$

Ş

```
RESULT 15
US-10-138-970A-22
US-10-138-970A-22;
Sequence 22, Application US/10138970A
Publication No. US20030079255A1
Publicant INFORMATION:
APPLICANT: Sariasiani, Sima
APPLICANT: Tang, Xiao-Song
APPLICANT: Qi, Wei Wei
TITLE OF INVENTION: Methods for the Pro-
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     ; LOCATION: (502)..(502)
; OTHER INFORMATION: X= Gly, A
; NAME/KEY: UNSURE
; LOCATION: (540)..(540)
; OTHER INFORMATION: X= Thr, A
US-09-765-873A-38
                                                                                                                                                                                      Ş
                                                                                                                                                                                                                       В
                                                                                                                                                                                                                                                 8
                                                                                                                                                                                                                                                                               B
                                                                                                                                                                                                                                                                                                      Ş
                                                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                                                  Š
                                                                                                                                                                                                                                                                                                                                                                                                   片
                                                                                                                                                                                                                                                                                                                                                                                                                           Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                          ₽
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           δÃ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   δÃ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             멍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Matches 609;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Query Match
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Local
                                                                                                                                                                                                                                                                               594
                                                                                                                                                                                                                                                                                                                                        534
                                                                                                                                                                                                                                                                                                                                                                    541
                                                                                                                                                                                                                                                                                                                                                                                                   474
                                                                                                                                                                                                                                                                                                                                                                                                                             481
                                                                                                                                                                                                                                                                                                                                                                                                                                                          414
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   354
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            294
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    234
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             174
                                                                                                                                                                                           721
                                                                                                                                                                                                                        651
                                                                                                                                                                                                                                                    661
                                                                                                                                                                                                                                                                                                           601
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       421
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     114
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             ឫ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     ப
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               1 MAPSIDSIATSXANGXXNGXHAAXXASXXXXXXXXXXAXAGSXLPTTXXTQLDIVEXXLAD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Similarity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   NSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAITGHPDSKV
                                                                                                                                                                                                                                              SSPALXYLSPRTRVLYSFVREELGVKARRGDVFLGKQEVTIGSNVSRIYEAIKSGRINXV
                                                                                                                                                                                                                                                                                                      EPRWHDAFSXATGTVVEXLSSXXXXXVSLAAVNAWKVAXAEKAISLTRXVRXXFWXAPSS
                                                                                                                                                                                                                                                                                                                                                                                                                  AAAYTSELGHLANPVTTHVQDAEMGNQAVNSLALISARRTAEANDVLSLLLATHLYCVLQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                           QASAVXNTMEKTRLALALIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               DEGILRODRYPLRTSPOWLGPLVSDMIHAHAVLSLEAGOSTTDNPLIDVENKXTHHGGNF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                QALTALTVEAMVGHAGSFHPFLHDVTRPHPTQIEVARNIRTLLEGSXFAVHHBEEVKVKD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            NSLTRGHSAVRLVVLEALINFLNHGITFIVPLRGTISASGDLSPLSYIAAAISGHPDSKV
                                                                                                                                                                                           LVKMLA 726
                                                                                                                                                                                                                        SSPALSYLSPRTQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNV
                                                                                                                                                                                                                                                                               VPRWHDAFSFAAGTVVEVLSS---TSLSLAAVNAWKVAAAESAISLTRQVRETFWSAAST
                                                                                                                                                                                                                                                                                                                                        AIDLRAXEFEFKKQFGPAIVSLIDQHFGSAMTGSNLRDELVEKVNKTLAKRLEQTNSYDL
                                                                                                                                                                                                                                                                                                                                                                  QAAAVANTMEKTRLGLAQIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   DEGILRODRYPLRTSPOWLGPLVSDLIHAHAVLTIEAGOSTIDNPLIDVENKTSHHGGNF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            QSLTAMTVEAMVGHAGSFHPFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEVKVKD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   HVVHEGKEKILYAREAMALFNLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               HVXHEGXEKIMXAREAIALFGLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      TGFGGSADTRTEDAISLQKALLEHQLCGVLPSSFDSFRLGRGLENSLPLEVVRGAMTIRV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         TGFGGSADTRTEDAISLQKALLEHQLCGVLPTSXDSFXLGRGLENSLPLEVVRGAMTIRV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            P-TDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        PXTDDXXELDGYSLTLGDVVGAARKGRXVRVXDSDEIRXKIDKSVEFLRXQLXNSVYGVT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   MAPSIDSISHSFANGVASAKQAVNGAS-----TNLAVAGSHLPTTQVTQVDIVEKMLAA
                                                                                                                                                               LLKMLA
                                                                                                                                                                                                                                                                                                                                                                                                AAAYTSELGHLANPVTTHVQPAEMANQAXNSLALISARRTTESNDVLSLLLATHLYCVLQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Conservative
                                                                                                                                                                 716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           89.6%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ala,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Ala,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              24; Mismatches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Score 3014;
Pred. No. 3
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ser,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Ser,
    Production
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Pro,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           .7e-297
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Gly
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         DB 9;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              83;
    Ċ,
    Tyrosine,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Length 716;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Indels
    Cinnamic
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              10;
    Acid
                                                                                                                                                                                                                                                                                                                                                                                                                             540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              420
                                                                                                                                                                                                                        710
                                                                                                                                                                                                                                                                                                           660
                                                                                                                                                                                                                                                                                                                                                                     600
                                                                                                                                                                                                                                                                                                                                                                                                                                                          473
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 413
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      173
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             113
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         120
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     5,4
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  0
                                                                                                                                                                                                                                                                               650
                                                                                                                                                                                                                                                                                                                                        593
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            353
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    293
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            233
                                                                                                                                                                                                                                                                                                                                                                                                533
    and
    Para-
```

```
; TITLE OF INVENTION: hydroxycinnamic Acid
; FILS REFERENCE: CL1777
; CURRENT APPLICATION UNIVER: US/10/138,970A
; CURRENT FILING DATE: 2002-07-23
; NUMBER OF SEQ ID NOS: 24
; SOFTWARE: Microsoft Office 97
; SEQ ID NO 22
; LENGTH: 716
; TYPE: PRT
; CRGANISM: Rhodotorula glutinis
밁
                               Š
                                                                      밁
                                                                                              5
                                                                                                                                         밁
                                                                                                                                                                        Š
                                                                                                                                                                                                             片
                                                                                                                                                                                                                                         8
                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                               Ş
                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                    Ś
                                                                                                                                                                                                                                                                                                                                                                                                                         片
                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             덩
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         占
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  : NAME/KEY: MISC FEATURE
: LOCATION: (540)...(540)
: OTHER INFORMATION: Xaa=Thr,
US-10-138-970A-22
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Query Match
Best Local Similarity
Matches 609; Conserv
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    NAME/KEY: MISC FEATURE LOCATION: (540)..(540) OTHER INFORMATION: x=Thr,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        FEATURE:
NAME/KEY: MISC_FEATURE
LOCATION: (502)..(502)
OTHER INFORMATION: x=Gly,
                                                                      534
                                                                                                                                          474
                                                                                                                                                                                                             414
                                                                                                                                                                                                                                                421
                                                                                                                                                                                                                                                                                   354
                                                                                                                                                                                                                                                                                                                     361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               174
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     121
                                                                                                       541
                                                                                                                                                                              481
                                                                                                                                                                                                                                                                                                                                                      294
                                                                                                                                                                                                                                                                                                                                                                                         301
                                                                                                                                                                                                                                                                                                                                                                                                                           234
                                                                                                                                                                                                                                                                                                                                                                                                                                                            241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    114
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            1 MAPSIDSIATSXANGXXNGXHAAXXASXXXXXXXXXXAXAGSXLPTTXXTQLDIVEXXLAD
                                                                                                AAYISELGHLAHPYTTHYQPASMANQAXNASLALISARRTTSANDUSLILHATHIYCVLQ
                                                                                                                                                                    AAAYTSELGHLANPVTTHVQPAEMGNQAVNSLALISARRTAEANDVLSLLLATHLYCVLQ
                                                                                                                                                                                                                                   QASAVXNTMEXTRIALALIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIA
                                                                                                                                                                                                                                                                                                        DEGILRQDRYPLRTSPQWLGPLVSDMIHAHAVLSLEAGQSTTDNPLIDVENKXTHHGGNF
                                                                                                                                                                                                                                                                                                                                                                           QALTALTVEAMVGHAGSFHPFLHDVTRPHPTQIEVARNIRTLLEGSXFAVHHEEEVKVKD
                                                                                                                                                                                                                                                                                                                                                                                                                                                      HVXHEGXEKIMXAREAIALFGLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    NSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAITGHPDSKV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              TGFGGSADTRTEDAISIQKALLEHQLCGVLPTSXDSFXLGRGLENSLPLEVVRGAMTIRV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        P-TDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             PXTDDXXELDGYSLTLGDVVGAARKGRXVRVXDSDEIRXKIDKSVEFLRXQLXNSVYGVT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             MAPSLDSISHSFANGVASAKQAVNGAS-----TNLAVAGSHLPTTQVTQVDIVEKMLAA
   VPRWHDAFSFAAGTVVEVLSS----TSLSLAAVNAWKVAAAESAISLTRQVRETFWSAAST
                                                                      AIDLRAXEFEFKKQFGPAIVSLIDQHFGSAMTGSNLRDELVEKVNKTLAKRLEQTNSYDL
                                                                                                                                                                                                                                                                                                                                                      QSLTAMTVEAMVGHAGSFHPFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEVKVKD
                                                                                                                                                                                                                                                                                                                                                                                                                           HVVHEGKEKILYAREAMALFNLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               NSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAISGHPDSKV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  TGFGGSADTRTEDAISLQKALLEHQLCGVLPSSFDSFRLGRGLENSLPLEVVRGAMTIRV
                                 EPRWHDAFSXATGTVVEXLSSXXXXXVSLAAVNAWKVAXAEKAISLTRXVRXXFWXAPSS
                                                                                                                                                                                                             QAAAVANTMEKTRLGLAQIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIA
                                                                                                                                                                                                                                                                                  DEGILRODRYPLRTSPOWLGPLVSDLIHAHAVLTIEAGOSTTDNPLIDVENKTSHHGGNF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                83.6%
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ala,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Ala,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              ; Score 3014; [; Pred. No. 3.7e 24; Mismatches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ala,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ser,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ser, Thr,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ser,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Pro,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              ; DB 14;
3.7e-297;
nes 83;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GLY
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Gly
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               10;
```

360

293 300 233 240

420

413

540

593 600 533

660

480

473

Gaps

60

120 5 4

180 113

173

Ś

SSPALXYLSPRTRVLYSFVREELGVKARRGDVFLGKQEVTIGSNVSRIYEAIKSGRINXV

Searc Job t	DЪ	Ş	οd
Search completed: September 9, 2004, 10:24:27 Job time : 96.3859 secs	711 LIKMLA 716	721 LVKMLA 726	651 SSPALSYLSPRTQILYAFVREELGYKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNV 710

```
Result
No.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Database :
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Post-processing: Minimum Match 0%
Maximum Match 100%
Listing first 45 st
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Minimum DB
Maximum DB
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Total number of hits satisfying chosen parameters:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Scoring table:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Sequence:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Title:
Perfect score:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Run
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         OM protein -
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  97.
             3322887543210
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                10
11
12
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Pred. No. is the number of results predicted by chance to have a score greater than or equal to the score of the result being printed, and is derived by analysis of the total score distribution.
      223221
22922.21
1294.5
1100.5
958.65
958.65
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.5
946.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Score
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   seq length: 0
seq length: 2000000000
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         protein search, using sw model
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 %
Query
Match Length I
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             US-09-939-408A-21
3365
1 MAPSLDSIATSXANG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              September 9, 2004, 09:50:23; Search time 16.5685 Seconds (without alignments)
2281.620 Million cell updates/sec
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                141681 segs, 52070155 residues
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      BLOSUM62
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Gapop 10.0 , Gapext 0.5
          SwissProt_42:*
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                MAPSLDSIATSXANGXXNGX......RIYEAIKSGRINXVLVKMLA 726
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        GenCore version 5.1.6 Copyright (c) 1993 - 2004 Compugen Ltd.
          멂
PALY RHOTO
PALY RHORD
PALY JAMANU
PALY USTMA
PALLY PINTA
PALLA PETCR
PALLY TRISU
PALLI PRUAV
PALLI PETCR
PALLI TOBAC
PALLI CAMSI
PALLY CAMSI
PALLY CAMSI
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOBAC
PALLY TOB
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       IJ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                summaries
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       SUMMARIES
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             141681
                                                                                                                                                                                                                                                                                              p35510 arabidopsis
p4572 petroselinu
p52777 pinus taeda
p27990 medicago sa
p14717 oryza sativ
p45734 trifolius aviu
p244963 prunus aviu
p244963 prunus aviu
p245728 petroselinu
p27991 glycine max
Q9ss45 arabidopsis
p25872 nicotiana t
c033924 digitalis 1
p4573 nicotiana t
c133924 digitalis 1
p4573 nicotiana t
c23924 digitalis 1
p4573 nicotiana t
p35511 Lycopersico
Q01861 pisus dasiv
Q9m568 rubus dasiv
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     P11544 rhodosporid
P10248 rhodotorula
033967 amanita mus
Q96v77 ustilago ma
P35510 arabidopsis
          Q9m568
P25600
P45720
O04058
P35513
P19142
P191442
191442
P19144
P19144
P19144
P19144
P19144
P19144
P19144
P19144
P1914
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Description
      nicotiana t
phaseolus v
phaseolus v
phaseolus v
daucus caro
oryza sativ
pisum sativ
lithospermu
stylosanthe
                                                                                                                                                                                                                                                                      helianthus
```

. Ааааааааааааааааааааааааааа	CCCCCCCCCCRARRARRE	: 전쟁정전쟁전쟁점		
		-UN:NKON-KKUN	ing dia oo ing a	88888888888888888888888888888888888888
terpro;	SEQUENCE FROM N. SEQUENCE FROM N. SEQUENCE FROM N. STRAIN-IFO 0559; MEDLINE-88112970 Anson J.G., Gilb "Complete nucleo coding for pheny Gene 58:189-199; -!- FUNCTION: Ca phenylalanin -!- CATALYTIC AC -!- PATHWAY: Phe -!- SUBCELLULAR -!- SUBCELLULAR -!- FTM: Contain which is for of residues -!- SIMILARITY:	Transport Hyar	1 HOTO ALY RHOTO 11544; 1-OCT-1989 1-NOV-1990 0-OCT-2003 henylalani	923.5 923.5 922 910.5 910.5 910.5 910.5 910.5 910.5 910.5 910.5 910.5 910.5 910.5 910.5 910.5 910.5
PROT e Swi n Bic d thi d thi drail email 2; CA 2; CA 2; CA 2; AC 0; AS pROOS	PROM N.A.  0 0559;  88112870; Pu 88112870; Pu 9. Gilbert 10 nucleotide 1	rungi; sayceti 5286; 5286; OM N. J 14; 27061; i.F., i.the f.the	ST (Rel. (Rel. (Rel. ne amm	20202027777777777777777777777777777777
1007. 1007. 1007. 1007. 1007.	PubMert H.G. rt H.G. rt H.G. ride selde se	ruloid Basid dae; S PubMe rum H. gene f ruloid 1 (1991	STANDARD; 21. 12, Cr 21. 16, La 21. 42, La 21. 42, La 21. 42, La	718 710 590 720 720 715 695 710 710 710 717 707
enticut titt	d=2828 q. Oran quence quence e ammoi the n L-phe anoid i N: Cyt tive s cocatal to th	is (	8 C C C C C C C C C C C C C C C C C C C	4444444444
ght. Bic Stitu stitu not p-sib 311ya	184; of J.D. of the of	east) (1 ota; Ur iobolal iobolal 3059; enylala	PRT; ed) sequence annotatio	PALL CICAR PALL LITER PALL SOLTU PALL SOLTU PALL SOLTU PALL SOLTU PALL POPTI PALL POPTI PALL POPXI PALL POPXI PALL POBA PALL POBB PALL P
יובע טינוי י	1 E H D H C H D E S - D H	(Rhodotoru Urediniomycales, Rhodo	716 A update n upda	ICAR OLTU OLTU OLTU OLTU OPTR RATH HAVU OPXI POBA HEAT HEAT
producerics ere ar es it http:	sporide sporid	nia-	A.	
ed t	ium  tion  d a  cinn  ste  nida  tion	racil idium		
he EMB restri tent i y and .isb-si	oruloid of L- ree amm mate + ole-5-c ole-5-c	is).		Q9smk9 Q42667 Q42667 Q43542667 P45730 P45733 P19143 P19143 P45731 P14731
colla Ctions s in for cc b.ch/a	gen ium (3).			cicer silhos solhos solan citrus solan populu arabit phasec populu populu tritic
ion ion it va rcia unce	p on.			permu permu rub: limo rub: limo rub sis tri lopsis vius vius vius vius kit skit skit sa bat um ae
labora ns on n no commer /annou	ne ion.			cer ariet tthospermu planum tub ltrus limo lanum tub pulus tri rabidopsis rabidopsis rabidopsis youlus kit youlus kit youlus kit youncea bat riticum ae

```
RESULT 2
PALY_RHORB
ID _PALY_RHORB
AC P10248;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Дb
                                                                                                      유
                                                                                                                                                               B
                                                                                                                                                                                             8 8 8
                                                                                                                                                                                                                                                                                              Ď,
                                                                                                                                                                                                                                                                                                                              5
                                                                                                                                                                                                                                                                                                                                                                  Ъ
                                                                                                                                                                                                                                                                                                                                                                                                Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                         DP
DP
                                                                                                                                                                                                                                                                                                                                                                                                                                                                8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     SOF FITTER SERVICES
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Query Match
Best Local S
Matches 610
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Pfam; PF00221; PAL; 1.
TIGRPANS; TIGR01226; phe am lyase; 1.
PROSITE; PS00488; PAL HISTIDASE; 1.
Lyase; Phenylpropanoid metabolism.
Lyase; Phenylpropanoid 5-imidaz
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 CONFLICT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 MOD_RES
                                                                                                      711
                                                                                                                                    721
                                                                                                                                                                      651
                                                                                                                                                                                                      661
                                                                                                                                                                                                                                        594
                                                                                                                                                                                                                                                                       601
                                                                                                                                                                                                                                                                                                       534
                                                                                                                                                                                                                                                                                                                                       541
                                                                                                                                                                                                                                                                                                                                                                           474
                                                                                                                                                                                                                                                                                                                                                                                                         481
                                                                                                                                                                                                                                                                                                                                                                                                                                          414
                                                                                                                                                                                                                                                                                                                                                                                                                                                                        421
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          354
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          294
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           234
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             174
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             114
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                ហ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 610;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Similarity
                                                                                                                                                                  LLKMLA
                                                                                                                                    LVKMLA
                                                                                                                                                                                                                                      VPRWHDAFSFAAGTVVEVLSS---TSLSLAAVNAWKVAAAESAISLTROVRETFWSAAST
                                                                                                                                                                                                                                                         EPRWHDAFSXATGTVVEXLSSXXXXXVSLAAVNAWKVAXAEKAISLTRXVRXXFWXAPSS
                                                                                                                                                                                                                                                                                                    AIDLRAIEFEFKKQFGPAIVSLIDQHFGSAMTGSNLRDELVEKVNKTLAKKLEQTNSYDL
                                                                                                                                                                                                                                                                                                                                AVDLRAMBFBFKKQFXPXXXXLLXQHFGXXXTXXXXXXBLXXKVXKXLXKRLBQTNSYDL
                                                                                                                                                                                                                                                                                                                                                                     AAAYTSELGHLANPVTTHVQPAEMANQAVNSLALISARRTTESNDVLSLLLATHLYCVLQ
                                                                                                                                                                                                                                                                                                                                                                                                  AAAYTSELGHLANPVTTHVQPAEMGNQAVNSLALISARRTAEANDVLSLLLATHLYCVLQ
                                                                                                                                                                                                                                                                                                                                                                                                                                       QAAAVANTMEKTRLGLAQIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                          QASAVXNTMEKTRLALALIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       DEGILRQDRYPLRTSPQWLGPLVSDLIHAHAVLTIEAGQSTTDNPLIDVENKTSHHGGNF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          DEGILRQDRYPLRTSPQWLGPLVSDMIHAHAVLSLEAGQSTTDNPLIDVENKXTHHGGNF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             QALTALTVEAMVGHAGSFHPFLHDVTRPHPTQIEVARNIRTLLEGSXFAVHHEEEVKVKD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          HVVHEGKEKILYAREAMALFNLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  HVXHEGXEKIMXAREAIALFGLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         NSLTRGHSAVRLVVLEALTNELNHGITPIVPLRGTISASGDLSPLSYIAAAISGHEDSKV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               NSLTRGHSAVRLVVLEALTNFLNHGITFIVPLRGTISASGDLSPLSYIAAAITGHPDSKV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  TGFGGSADTRTEDAISLQKALLEHQLCGVLPTSXDSFXLGRGLENSLPLEVVRGAMTIRV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  PXTDDXXELDGYSLTLGDVVGAARKGRXVRVXDSDEIRXKIDKSVEFLRXQLXNSVYGVT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        QSLTAMTVEAMVGHAGSFHPFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEVKVKD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           TGFGGSADTRTEDATSLQKALLEHQLCGVLPSSFDSFRLGRGLENSLPLEVVRGAMTIRV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              P-TDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              MAPSIDSISHSFANGVASAKQAVNGAS-----TNLAVAGSHLPTTQVTQVDIVEKMLAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                MAPSIDSIATSXANGXXNGXHAAXXASXXXXXXXXXXAXAGSXIPTTXXTQIDIVEXXLAD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   212
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   4
                     STANDARD;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 AA;
                                                                                                                                    726
                                                                                                      716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 212
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 76879
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   37
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                89.8%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 W.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 25;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              (By similarity).

DHA (2,3-DIDEHYDROALANINE)
(BY SIMILARITY).
SLDSISHSFANGVASAKQAVNGASTNLAVAGSHL
RPTSQSQARTC (IN REF. 2).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Score 3021; DB 1;
Pred. No. 9.8e-227;
                     PRT;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 5-imidazolinone (Ala-Gly)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 OCIDF61769A4E5E6 CRC64;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Mismatches
                     713
                     A
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                81;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              10;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Gaps
                                                                                                                                                                      710
                                                                                                                                                                                                                                                                    660
                                                                                                                                                                                                                                                                                                                                    600
                                                                                                                                                                                                                                                                                                                                                                     533
                                                                                                                                                                                                                                                                                                                                                                                                     540
                                                                                                                                                                                                                                                                                                                                                                                                                                         473
                                                                                                                                                                                                                                                                                                                                                                                                                                                                       480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        420
                                                                                                                                                                                                                                                                                                      593
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        413
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        353
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          293
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             173
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             180
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              113
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            120
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              54
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         233
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                60
                                                             Ś
á
                               밁
                                                                                                 밁
                                                                                                                             Š
                                                                                                                                                                                                                                    STEP TARKER REPORTED TO SOLUTION OF THE PROPERTY OF SOLUTION OF THE PROPERTY OF SOLUTION OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF TH
 121
```

```
Query Match
Best Local S
Matches 595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         This SWISS-PROT entry is copyright. It is produced through a collaboration between the Swiss Institute of Bioinformatics and the EMBL outstation the European Bioinformatics Institute. There are no restrictions on its use by non-profit institutions as long as its content is in no way modified and this statement is not removed. Usage by and for commercial entities requires a license agreement (See http://www.isb-sib.ch/announce/or send an email to license@isb-sib.ch).
                                                                                                                                                                                                                                                                                      SEQUENCE
                                                                                                                                                                                                                                                                                                                                                                                                                                           HSSP; P21310; 188F.
InterPro; IPR008948; L-Aspartase-like.
InterPro; IPR001916; Phe/His_NH31yase.
InterPro; IPR005922; Phe_am_lyase.
Pfam; PF00221; PAL; 1.
                                                                                                                                                                                                                                                                                                                          MOD_RES
                                                                                                                                                                                                                                                                                                                                                                                                           PROSITE;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         EMBL; X13094; CAA31486.1; -.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    MEDLINE=89083583;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       DETAILS.
STRAIN=NRRL Y-15597;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        SEQUENCE FROM N.A.
STRALN=NREL Y-15597;
MEDLINE=89083582; PubMed=3205749;
Filpula D., Strausberg R.L., Vaslet C.A., Sykes
"Nucleotide sequence of gene for phenylalanine
Rhodotorula rubra.";
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ol-MAR-1989 (Rel. 10, Created)
Ol-JAN-1990 (Rel. 13, Last sequence up
10-CCT-2093 (Rel. 42, Last annotation
Phenylalanine ammonia-lyase (EC 4.3.1
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Nucleic Acids Res. 16:11381-11381(1988)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Microbotryomycetidae;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 NCBI_TaxID=5537;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Rhodotorula
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Eukaryota;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Rhodotorula
                                                                                                                                                                                                                         Local Similarity
                                                                                                                                                                                                                                                                                                                                                                  ICRFAMS; TIGRO1226; phe_am_lyase; 1.
ROSITE; PS00488; PAL_HISTIDASS; 1.
Vase; Phenylpropanoid metabolism.
ROSSINK 217 219 5-imidaz
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      S01999; S01999.
                                       60
                                                                            5
                                                                                                                       ш
                                       AGATDQIKLDGYTLTLGDVVGAARRGRSVKVADSPHIREKIDASVEFLRTQLDNSVYGVT
                                                                                                                                                            MAPSIDSIATSXANGXXNGXHAAXXASXXXXXXXXXXAXAGSXIPTTXXTQIDIVEXXIAD
                                                                     PXTDDXXELDGYSLTLGDVVGAARKGRXVRVXDSDEIRXKIDKSVEFLRXQLXNSVYGVT
                                                                                                                       MAPSVDSIATSVANSLSNGLHAAAAAN-GGDVHKKTAGAGSLLPTTETTQLDIVERILAD
TGFGGSADTRTEDAISLQKALLEHQLCGVLPTSXDSFXLGRGLENSLPLEVVRGAMTIRV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Fungi;
                                                                                                                                                                                                                                                                                   713 AA;
                                                                                                                                                                                                       Conservative
                                                                                                                                                                                                                                                                                                                             218
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   (Yeast) (Rhodotorula mucilaginosa).
Basidiomycota; Urediniomycetes;
dae; Sporidiobolales; mitosporic Sporidiobolales;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      PubMed=3205750;
                                                                                                                                                                                                                                                                                                                             218
                                                                                                                                                                                                                                                                                      76000 MW;
                                                                                                                                                                                                                    86.8%; Score 2922.5; DB 1;
82.0%; Pred. No. 4.3e-219;
                                                                                                                                                                                                                                                                                                       (By similarity).
DHA (2,3-DIDEHYDROALANINE)
(BY SIMILARITY).
                                                                                                                                                                                                                                                                                                                                                                      5-imidazolinone
                                                                                                                                                                                                                                                                                      6EB8317CBB037D88 CRC64;
                                                                                                                                                                                                       Mismatches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    update)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        n update)
L.5).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Sykes A.,
                                                                                                                                                                                                                                                                                                                                                                  (Ala-Gly)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           ammonia-lyase
                                                                                                                                                                                                     Indels
                                                                                                                                                                                                                                          Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Levy A.;
                                                                                                                                                                                                                                            713;
                                                                                                                                                                                                     13;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             from
                                                                                                                                                                                                     Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            ion.
                                                                              120
                                                                                                                       59
                                                                                                                                                              60
```

Ş

B. Ş

밁

망

Ş

```
RESCUT 3
PALY AMAMU
ID PALY AVA
O93967
DT 10-OCT
DT 10-OCT
DT 10-OCT
DT 50-OCT
DT 50-OCT
DT 50-OCT
DT 60-OCT
DT 60-OCT
DT 60-OCT
DT 70-OCT
DT 70-OCT
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agaric
CO Agar
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               10-0CT-2003
10-0CT-2003
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              PALY AMAMU
093967;
                   Amanita muscaria (Fly agaric).
Eukaryota; Fungi; Basidiomycota; Hymenomycetes; Homobasidiomycetes;
Agaricales; Amanitaceae; Amanita.
                                                                                                                                                                                                                                                                                                                                                                                   SEQUENCE FROM N.A.
                                                                                                                                                                                                                                                                                                                                                                                                                                   NCBI_TaxID=41956;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Phenylalanine
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       536
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               708
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               721
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     648
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           661
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              591
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 601
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          541
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                476
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   481
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           416
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            421
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 356
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          296
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            180
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  120
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        QASAVXNTMEKTRLALALIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               HVXHEGXEKIMXAREAIALFGLEPVVLGPXEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               LVKMMA 713
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               LVKMLA 726
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  SSPALXYLSPRTRVLYSFVREELGVKARRGDVFLGKQEVTIGSNVSRIYEAIKSGRINXV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      EPRWHDAFSXATGTVVEXLSSXXXXXVSLAAVNAWKVAXAEKAISLTRXVRXXFWXAPSS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    AVDLRAMEFEHTKAFEPMVTELLKQHFGALAT----AEVEDKVRKSIYKRLQQNNSYDL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          AVDLRAMEFEFKKQFXPXXXXLLXQHFGXXXTXXXXXXXELXXKVXKXLXKRLEQTNSYDL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            AAAYTSELGHLANPYTTHVQPAEMGNQAVNSLALISARRTAEANDVLSLLLATHLYCVLQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 DEGILRQDRYPLRTSPQWLGPLVSDMIHAHAVLSLEAGQSTTDNPLIDVENKXTHHGGNF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            QALTALTVEAMVGHAGSFHPFLHDVTRPHPTQIEVARNIRTLLEGSXFAVHHEEEVKVKD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     NSLTRGHSAVRLVVLEALTNFLNHGITFIVFLRGTISASGDLSFLSYIAAAITGHPDSKV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            TGFGGSADTRTEDAISLQKALLEHQLCGVLPTSMDGFALGRGLENSLPLEVVRGAMTIRV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        SSPALKYLSPRTRVLYSFVREEVGVKARRGDVYLGKQEVTIGTNVSRIYEAIKSGCIAPV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              EQRWHDTFSVATGAVVEALAG---QEVSLASLNAWKVACAEKAIALTRSVRDSFWAAPSS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             AAAYTSELGHLANPVSTHVQPAEMGNQAINSLALISARRTAEANDVLSLLLATHLYCVLQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         MASS V GNTMEKTRLA VALMGKVS FTQLTEMLNAGMNRALPSCLAAEDPSLSYHCKGLDIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 DEGILRODRYPLRCSPOWLGPLVSDMIHAHAVLSLEAGOSTTDNPLIDLENKMTHHGGAF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       QALTALTVEAMVGHAGSFHPFLHDVTRPHPTQIEVARNIRTLLEGSKYAVHHETEVKVKD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   HV--DG--KIMSAQEAIALKGLQPVVLGPKEGLGLVNGTAVSASMATLALTDAHVLSLLA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         NSLTRGHSAVRIVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAASITGHPDSKV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               (Rel.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Rel. 42, Last sequence update)
Rel. 42, Last annotation update)
ammonia-lyase (EC 4.3.1.5).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             STANDARD;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 444
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Created)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          740
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             ጅ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               179
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           647
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 999
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       590
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          600
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                535
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           475
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 415
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       355
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   295
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         239
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        707
```

Š В Ś B Ş 밁 Ś 밁 Ś 밁 Ś 밁 Ś

```
Ъ
                                                                                                                                                                                                      В
                                                                                                                                                                                                                             S
                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                          5
                                                                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                                                                 Ş
                                                                                                                                                                                                                                                                                                                                                                                                           Š
                                                                                                                                                                                                                                                                                                                                                                                                                                           В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                 Ś
                                                                                  밁
                                                                                                             Š
                                                                                                                                            밁
                                                                                                                                                                  5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Matches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Query Match
Best Local
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Pfam; PF00221; PAL; 1.
TIGREPANS; TIGRO1226; phe am lyase; 1.
PROSITE; PS00488; PAL HISTIDASE; 1.
Lyase; Phenylpropanoid metabolism.
CROSSLNK 224 226 5-inidaz
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 This SWISS-PROT entry is copyright. It is produced through a collable between the Swiss Institute of Bioinformatics and the EMBL outst the European Bioinformatics Institute. There are no restrictions use by non-profit institutions as long as its content is in modified and this scattement is not removed. Usage by and for contentities requires a license agreement (See http://www.isb-sib.ch/ar send an email to license@isb-sib.ch).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              SEQUENCE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       MOD_RES
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           InterPro; IPR008948; L-Aspartase-like.
InterPro; IPR001106; Phe/His NH3lyase.
InterPro; IPR005922; Phe_am_lyase.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          EMBL; AJ010143; CAA
HSSP; P21310; 188F.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       189
                                                                                                                                               545
                                                                                                                                                                                                         489
                                                                                                                                                                                                                                                                   429
                                                                                                                                                                                                                                                                                                420
                                                                                                                                                                                                                                                                                                                           369
                                                                                                                                                                                                                                                                                                                                                                                     309
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  129
709
                                                        929
                                                                                                                 600
                                                                                                                                                                                                                                     480
                                                                                                                                                                                                                                                                                                                                                         361
                                                                                                                                                                                                                                                                                                                                                                                                               301
                                                                                                                                                                                                                                                                                                                                                                                                                                             249
                                                                                                                                                                                                                                                                                                                                                                                                                                                                           242
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    183
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  288;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            69
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Similarity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        LTRGHSAVRLVVLEALTNFLNHGITPIVFLRGTISASGDLSFLSYIAAAITGHFDSKVH-
                                                                                    NTDRMTTMAATSSSVLLQFFTDSGASVPPSSCDLLSSVSSFQSSVATRSSVLMDDLRKEY
                                                                                                                                                                                                                          AAAAYTSELGHLANPVTTHVQPAEMGNQAVNSLALISARRTAEANDVLSLLLATHLYCVL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                SADTRTDKPMLLGFALLQHQHVGILPTSTEPLDVLPLQDANNTSMPEAWIRGAILIRMNS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        SADTRTEDAISLQKALLEHQLCGVLPTSX---DSFXLGRGLENSLPLEVVRGAMTIRVNS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        ELDGYSLTLGDVVGAARKGRXVRVXDSDEIRXKIDKSVEFLRXQLXN--SVYGVTTGFGG
YEAIKSGRINXVLVKM
                                                                                                                   LEPRWHDAFSXATGTVVEXLSSXXXXXVS-----LAAVNAWKVAXAEXAISLTRXVRXXF
                                                                                                                                                                           QAVDLRAMEFEFKKQFXPXXXXLLXQHFGXXXTXXXXXXELXXKVXXXXLXKRLEQTNSYD
                                                                                                                                                                                                                                                                                                                           DKYTLRQDRYPLRTSPQFLGPQIEDIISAFQTVTQECNYLPATDNPLIDGETGESHHGGN
                                                                                                                                                                                                                                                                                                                                                    DEGILRQDRYPLRTSPQWLGPLVSDMIHAHAVLSLEAGQ-STTDNPLIDVENKXTHHGGN
                                                                                                                                                                                                                                                                                                                                                                                   QALTALTVEAMVGHAGSFHPFLHDVTRPHPTQIEVARNIRTLLEGSXFAVHHEEEVKVKD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                -VXHEGXEKIMXAREAIALFGLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        LIRGHSGIRWELIEKMRELLAANVIPVVPLRGSISSSGDLSPLSYIAGTIIGNPSIKVYH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          KVDGQTLSIAAVAAAARYNAAVELDESPLVKERVRKSQLAIANKVSTGASVYGLSTGFGG
                            IFGDRGPTPASQYIG-KTRPVYQFIRTTIGVRKHGSENYNKFYNGLGVEDVTIGQNISRI
                                                                                                                                                                                                         ATAAYVAE
                                                                                                                                                                                                                                                                                                                                                                                                                                              GPSKSGIRQIGSSKDVLALHNIEPFPLESKEPLGILNGTAFSASVAALALNEAIHLVLLA
                                                        WXAPSSSSPALXYLSPRTRVLYSFVREELGVKARRGDVF-
                                                                                                                                               QALDLRALQREFLPGLDIIIREELRSSFGSFLS-SEQMEKLQQNLTSAFEDHLDKTTTMD
                                                                                                                                                                                                                                                                   FQAMAVTNAMEKTRLALHHVGKLLFSQSTELVNPAMNRGLPPSVAATDPSLNYHAKGLDI
                                                                                                                                                                                                                                                                                             FQASAVXNIMEKTRIALALIGKINFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              740 AA;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Conservative 123; Mismatches 240;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           225
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CAA09013.1; -.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           225
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               80156 MW;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 38.5%;
                                                                                                                                                                                                         ATPGPTHIQSAEMHNQAVNSLALISARATITSLEVLTSLIASYLYILG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      metabolism.
5-imidazolinone
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Score 1294.5; DB 1;
Pred. No. 1.1e-92;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            (By similarity).
DHA (2,3-DIDEHYDROALANINE)
(BY SIMILARITY).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               B055CFF3D8B7BCEE CRC64;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  noved. Usage by and for commercial (See http://www.isb-sib.ch/announce/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        (Ser-Gly)
                                                     Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             EMBL outstation
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  740;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      25
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          collaboration
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 n 0
                                                                                                                                                                                                                                     539
                                                           708
                                                                                     663
                                                                                                                                                                             599
                                                                                                                                                                                                           544
                                                                                                                                                                                                                                                                    488
                                                                                                                                                                                                                                                                                                479
                                                                                                                                                                                                                                                                                                                              428
                                                                                                                                                                                                                                                                                                                                                         419
                                                                                                                                                                                                                                                                                                                                                                                      368
                                                                                                                                                                                                                                                                                                                                                                                                                 360
                                                                                                                                                                                                                                                                                                                                                                                                                                                308
                                                                                                                                                                                                                                                                                                                                                                                                                                                                           300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        248
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  188
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             182
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            128
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         125
                                                                                                                   654
                                                                                                                                                 603
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      9
```

351

-EWMDETKQQEIAAQVLKS

587 519 527 459 467

GKENLNEFKGE

690

638 645 578

699

```
THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION AND THE PART OF SOLUTION 
                       Ş
                                                     밁
                                                                                                  Ş
                                                                                                                                                      B
                                                                                                                                                                                      Ś
                                                                                                                                                                                                                                 В
                                                                                                                                                                                                                                                                                5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   뭉
                                                                                                                                                                                                                                                                                                                                   Query Match
Best Local S
Matches 287
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Kim S.-H., Maccona.....
Ellis B.E.;
"Cloning and disruption of a phenylalanine ammonia-lyase yo...-
"Cloning and disruption of a phenylalanine ammonia-lyase yo...-
Ustilago maydis.";
Submitted (SEP-2000) to the EMBL/GenBank/DDBJ databases.
Submitted (SEP-2000) to the nonoxidative deamination of L-
"""NCTION: Catalyzes the nonoxidative deamination of L-
""""CTION: Catalyzes the nonoxidative acid and a free ammonium
""""" FINCTION: Catalyzes the nonoxidative deamination of L-
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           TLT 4
[_USTMA
_PALY_USTMA
_Q96V77;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    This SWISS-PROT entry is copyright. It is produced through between the Swiss Institute of Bioinformatics and the Ew the Buropean Bioinformatics Institute. There are no restruce by non-profit institutions as long as its content modified and this statement is not removed. Usage by and entitles requires a license agreement (See http://www.isb-sor send an email to license@isb-sib.ch).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           10-OCT-2003 (Rel.
10-OCT-2003 (Rel.
10-OCT-2003 (Rel.
                                                                                                                                                                                                                                                                                                                                                                                                                            SEQUENCE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                MOD_RES
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 CROSSLNK
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 TIGREAMS; TIGR01226; phe_am_lyase; 1.
PROSITE; PS00488; PAL_HISTIDASE; 1.
Lyase; Phenylpropanoid metabolism.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     InterPro; IPR005922; F
Pfam; PF00221; PAL; 1.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              EMBL; AF306551; AAL09388.1; -.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      -
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   SEQUENCE FROM N.A.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ustilago maydis (Smut
Eukaryota; Fungi; Basi
Ustilaginomycetidae; U
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Phenylalanine
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                InterPro; IPR008948; L-Aspartase-like.
InterPro; IPR001106; Phe/His_NH3lyase.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           FUNCTION: Catalyzes the nonoxidative deamination of L-
phenylalanine to form trans-cinnamic acid and a free ammonic
phenylalanine to form trans-cinnamic acid and a free ammonic
phenylalanine trans-cinnamate + NH(
PATHWAY: Phenylpropanoid biosynthesis; first step.
SUBCELLULAR LOCATION: Cytoplasmic (Probable).
PTM: Contains an active site 4-methylidene-imidazole-5-one
which is formed autocatalytically by cyclization and dehydr.
of residues Ala-Ser-Gly (By similarity).
SIMILARITY: Belongs to the PAL / histidase family.
                                                                 161
                                                                                                           175
                                                                                                                                                          101
                                                                                                                                                                                                     127
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   723
                                                                                                                                                                                                                                               41
                                                                                                                                                                                                                                                                                           69
                                                                                                                                                                                                                                                                                                                                                        Similarity
  GHPDSKVHVXHEGXEKI-MXAREAIALFGLEPVVLGPKEGLGLVNGTAVSASMATLALHD
                                                                                                                                                                                         ADTRTEDAISLQKALLEHQLCGVLPT-----
                                                                                                                                                                                                                                               IDGYNLKIQGLVASARYGHVTRPRPSAETRKRIDDSVQSLIAKLDGGESIYGINTGFGGS
                                                                                                                                                                                                                                                                                         LDGYSLTLGDVVGAARKGRXVRVXDSDEIRXKIDKSVEFLRXQL--XNSVYGVTTGFGGS
                                                                    AIVVRLSSLMRGHSGVRWEVLDKMQKLFLQNNVTPVVPVRSSISASGDLSPLSYVAGALA
                                                                                                           AMTIRVNSLTRGHSAVRLVVLEALTN-FLNHGITPIVPLRGTISASGDLSPLSYIAAAIT
                                                                                                                                                          ADSRTANTRALQLALLQMQQCGVLPVPSTFPTGEPSSAPFALPLTDTESSLIMPEAWVRG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   YESIRDGKMQSIIVSL
                                                                                                                                                                                                                                                                                                                                                                                                                            724
                                                                                                                                                                                                                                                                                                                                                                                                                                                                    206
                                                                                                                                                                                                                                                                                                                                   Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           ammonia-lyase
                                                                                                                                                                                                                                                                                                                                                                                                                          A
A
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     STANDARD;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              42,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Basidiomycota; Ust
ae; Ustilaginales;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                    206
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 207
                                                                                                                                                                                                                                                                                                                                                                                                                            79277
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Phe_am_lyase
                                                                                                                                                                                                                                                                                                                                                      35.8%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          fungus)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Last sequence update)
Last annotation update)
-lyase (EC 4.3.1.5).
                                                                                                                                                                                                                                                                                                                                   114;
                                                                                                                                                                                                                                                                                                                                                                                                                          ₩,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   738
                                                                                                                                                                                                                                                                                                                                   Score 1205; DI
Pred. No. 9.1e
14; Mismatches
                                                                                                                                                                                                                                                                                                                                                                                                                                               (By similarity).

DHA (2,3-DIDEHYDROALANINE)

(BY SIMILARITY).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              5-imidazolinone (Ala-Gly)
=
                                                                                                                                                                                                                                                                                                                                                                                                                            02A73C97C34CD1AB
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ustilaginomycetes;
es; Ustilaginaceae;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     724
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           (See http://www.isb-sib.ch/announce,
                                                                                                                                                                                                                                                                                                                                                      DB 1;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     8
                                                                                                                                                                                                                                                                                                                                      245;
                                                                                                                                                                                                     SXDSFXLG-RGLENSL--PLEVVRG
                                                                                                                                                                                                                                                                                                                                                                                                                            CRC64;
                                                                                                                                                                                                                                                                                                                                                                           Length
                                                                                                                                                                                                                                                                                                                                      Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ustilago
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        restrictions on its
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     and
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   dehydration
                                                                                                                                                                                                                                                                                                                                   44;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 for
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          collaboration
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          'n
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      (MIO)
                                                                                                                                                                                                                                                                                                                                 Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ton
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          ö
                       292
                                                                 220
                                                                                                           233
                                                                                                                                                          160
                                                                                                                                                                                                     174
                                                                                                                                                                                                                                               100
                                                                                                                                                                                                                                                                                           126
    S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          ₽.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             RESULT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 吊
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              밁
                                            "Sequence
thaliana."
                                                                                                       SEQUENCE FROM N.A.
STRAIN=CV. Columbia;
MEDLINE=20083487; PubMed=10617197;
MEDLINE=20083487; PubMed=10617197;
MININECY. Mason T.M., Bowman C.L., Barnstead M.E., Feldblyum Fujii C.Y., Mason T.M., Bowman C.L., Barnstead M.E., Feldblyum Buell C.R., Ketchim K.A., Lee J.J., Ronning C.M., Koo H.L., Burll C.R., Coloun L.A., Shen M., Pai G., Van Aken S., Umayam Moffat K.S., Cronin L.A., Shen M., Pai G., Van Aken S., Umayam Tallon L.J., Gill J.E., Adams M.D., Carrera M.J., Creasy T.H., Goodman H.M., Somerville C.R., Copenhaver G.P., Preuss D., Goodman H.M., Somerville C.R., Copenhaver G.P., Fraser C.M., Nerman W.C., White O., Eisen J.A., Salzberg S.L., Fraser C.M.,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      PALL ARATH STANDARD; PRT; 725 AA.

P35510; Q92QD6;
01-JUN-1994 (Rel. 29, Created)
01-NOV-1995 (Rel. 32, Last sequence update)
10-CCT-2003 (Rel. 42, Last annotation update)
10-CCT-2003 (Rel. 42, Last annotation update)
phenylalanine ammonia-lyase 1 (EC 4.3.1.5).

PALI OR AT2G37040 OR TIJ8.22.
Arabidopsis thaliana (Mouse-ear cress).
Eukaryota; Viridiplantae; Streptophyta; Embryophyta; Tracheophyta;
Spermatophyta; Magnoliophyta; eudicotyledons; core eudicots; rosid
eurosids II, Brassicales; Brassicaceae; Arabidopsis.
                                                                                                                                                                                                                                                                                                                                                                                              SEQUENCE FROM N.A.
STRAIN=cv. Landsberg erecta;
MEDLINE=95195160; PubMed=7888622;
Wanner L.A., Li G., Ware D., Soms:
"The phenylalanine ammonia-lyase;
"The phenylalanine ammonia-lyase;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          ARATH
                                                                                                                                                                                                                                                                                                                                                        Plant
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             v
                                                                                                                                                                                                                                                                                                                                                                                  iana.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            579
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         700
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        639
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                646
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       588
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 520
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           528
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        460
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  468
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              400
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         410
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   341
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               352
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            281
                                                                                                                                                                                                                                                                                                                                                           Mol.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 T69
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 221
                         402:761-768(1999)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            FEQWNTTGGYVSVIYASIRDGELYNMLSEL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         ----TIGSNVSRIYEAIKSGRINXVLVKM
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        IYROVTIEFLDNPYACHAS -- HLLGKTKRAYEFVRKTLGVPMH--
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  LTRXVRXXFWXAPSSSSPALXYLSPRTRVLYSFVREELGVKARRGDVFLGKQEV---
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       LXKRLEQTNSYDLEPRWHDAFSXATGTVVEXLSS--XXXXXVSLAAVNAWKVAXAEKAIS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             PSLSYHCKGLDIAAAAYTSELGHLANPVTTHVQPAEMGNQAVNSLALISARRTAEANDVL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        -HEEEVKVKDDEGILRQDRYPLRTSPQWLGPLVSDMIHAHAVLSLEAGQSTTDNPLIDV-
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        AHMISIISQALTALTVEAMVGHAGSFHPFIHDVTRPHPTQIEVARNIRTILLEGSXFAVH-
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            MSKRLDETSSKOLRDRLVETYQDASSVLVRYFSELPSGGGADPLRNIVKWRATGVADTEK
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   SMIQAWSLYLLCQALDIRALQYKVAEQLPTLILASLHSHFG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         SLLLATHLYCVLQAVDLRAMEFEFKKQFXPXXXXLLXQHFGXXXXXXXXXXXELXXKVXKX
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          LSLNFHAKGINIALASVTSELMFLGNÞVSTHVQSAEMANQAFNSLALISGRQTLQAIECL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ENEKHVLFSEDNGTLRODRYTLQTASQWVGPGLEDIENAKRSVDFEI-NSTTDNPMIDPY
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          AENLASITQITTAMAVEALKGTDASFAPFIHEIARPHPGQIKSAKFIRAHLSGSRLAEHL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 GQRGIYCFVTDGRGQRVKVTADEACRMHKITPVQYEPKEALGLLNGTAFSASVAGLATYE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            DGDGRIHHGGNFQAMAMTNAVEKIRLALCAMGKMTFQQMTELVNPAMNRGLPANLASTPD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           - ENKXTHHGGNFQASAVXNTMEKTRLALALIGKLNFTQLTEMLNAGMNRGLPSCLAA - ED
                                                                                                                                                                                                                                                                                                                                                           Biol.
                                                                 analysis of
                                                                                                                                                                                                                                                                                                                                                           27:327-338 (1995)
                                                                                                                                                                                                                                                                                                                                                                                                   , Ware D., Somssich ammonia-lyase gene
                                                                    chromosome
                                                                 Ν
                                                                                                                                                                                                                                                                                                                                                                                                     family
                                                                 O.F
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         724
                                                                    the
```

Davis K.R.; y in Arabidopsis

rosids;

Town C.D.,

plant Arabidopsis

```
Ş
                                                                                                                                                              B
                                                                                                                                                                                           8
                                                                                                                                                                                                                              B
                                                                                                                                                                                                                                                         Š
                                                                                                                                                                                                                                                                                            В
                                                                                                                                                                                                                                                                                                                       Ś
                                                                                                                                                                                                                                                                                                                                                                                                                              Ş
                                  밁
                                                             Ş
                                                                                                B
                                                                                                                                                                                                                                                                                                                                                           Query Match
Best Local s
Matches 258
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       InterPro; IPR008948; L-Aspartase-like.
InterPro; IPR008948; L-Aspartase-like.
InterPro; IPR001106; Phe/His NH31yase.
InterPro; IPR005922; Phe_am_Tyase.
Pfam; PF00221; PAL; 1.
TIGRPAMS; TIGR01226; phe_am_Tyase; 1.
TIGRPAMS; TIGR01226; phe_am_Tyase; 1.
PROSITE; PS00488; PAL HISTIDASE; 1.
Lyase; Phenylpropanoid metabolism; Multigene face CROSSLNK 211 213 5-imidazolinone (A
                                                                                                                                                                                                                                                                                                                                                                                                                           CONFLICT
CONFLICT
CONFLICT
SEQUENCE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       the European Bioinformatics Institute. There are no rest by non-profit institutions as lng as its content modified and this statement is not removed. Usage by ar entities requires a license agreement (See http://www.isborsend an email to license@isb-sib.ch).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     MEDLINE=93005677; PubMed=2152131;
Ohl S., Hedrick S.A., Chory J., Lamb C.J.;
"Functional properties of a phenylalanine ammonia-lyase promoter Arabidopsis.";
Plant Cell 2:837-848(1990).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         This
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          EMBL; L33677; AAC18870.1; -. EMBL; AC006922; AAM15324.1;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          --
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        MOD_RES
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             EMBL;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            between
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      STRAIN=cv. Columbia;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     SEQUENCE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     FUNCTION: This is a key enzyme of plant metabolism catalyzing the first reaction in the biosynthesis from L-phenylalanine of a wide variety of natural products based on the phenylaropane skeleton. CATALYTIC ACTIVITY: L-phenylalanine = trans-cinnamate + NH(3). PATHWAY: Phenylpropanoid biosynthesis; first step. SUBCELULLAR IOCATION: Cytoplasmic (Probable). SUBCELULLAR IOCATION: Cytoplasmic (Probable).

FTM: Contains an active site 4-methylidene-imidazole-5-one (MIO), which is formed autocatalytically by cyclization and dehydration of residues Ala-Ser-Gly (By similarity).

SIMILARITY: Belongs to the PAL / histidase family.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          ; X62747; CAA446
S52990; S52990.
P21310; 1B8F.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        SWISS-PROT entry is copyright. It is produced through a collaboratic een the Swiss Institute of Bioinformatics and the EMBL outstation
 336
                                                                                                                                 218
                                                                                                                                                                                               158
                                                                                                                                                                                                                                                              100
                                                                                                                                                                                                                               86
                                                                                                                                                                                                                                                                                             ς,
Q
                                                                                                                                                                                                                                                                                                                            40
                                                                                                                                                                                                                                                                                                                                                                            Similarity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     ဝှု
                                                                                                                                                                                                                            GVNASSDWVMESMNKGTDSYGVTTGFGATSHRRTKNGVALQKELIRFLNAGIFGSTKET-
                                                                                                ASGDLVPLSYIAGLLTGRENSKA-TGENG--EALTAEEAFKLAGISSGFFDLQPKEGLAL
                                                                                                                                                                                                                                                              KIDKSVEFLRXQLXNSV--YGVTTGFGGSADTRTEDAISLQKALLEHOLCGVLPTSXDSF
                                                                                                                                                                                                                                                                                                                            GSXLPTTXXTQLDIVEXXLADPXTDDXXELDGYSLTLGDVVGAARKGRXVRVXDSDEIRX
 ARNIRTLIEGSXF----AVHHEEEVKVKDDEGILRODRYPLRTSPOWLGPLVSDMIHAHA
                                                               VNGTAVSASMATLALHDAHMLSLLSQALTALTVEAMVGHAGSFHPFLHDVTRPHPTQIEV
                                                                                                                               ASGDLSPLSYIAAAITGHPDSKVHVXHEGXEKIMXAREAIALFGLEP--VVLGPKEGLGL
                                                                                                                                                                ----SHTLPHSATRAAMLVRINTLLQGFSGIRFEILEAITSFLNNNITPSLPLRGTIT
                                                                                                                                                                                             XLGRGLENSLPLEVVRGAMTIRVNSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTIS
                                                                                                                                                                                                                                                                                             GAAAEQMKGSHLDEVKRMVÁE-FRKPVVNLGGETLTIGQVAAISTIGNSVKVELSETARA
                                                                                                                                                                                                                                                                                                                                                                                                                           329
426
612
725
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1-240 FROM N.A
                                                                                                                                                                                                                                                                                                                                                             Conservative 119;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             CAA44609.1; -.
                                                                                                                                                                                                                                                                                                                                                                                                                              AA;
                                                                                                                                                                                                                                                                                                                                                                                                                           329 V
426 R
612 V
78782 MW;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              212
                                                                                                                                                                                                                                                                                                                                                                            28.7%;
35.5%;
                                                                                                                                                                                                                                                                                                                                                                                                                         (By similarity).

DHA (2,3-UDDEHYDROALANINE)

(BY SIMILARITY).

V -> I (IN REF. 2).

                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           .'
                                                                                                                                                                                                                                                                                                                                                                           Score 965; DB 1;
Pred. No. 3.9e-67;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             olism; Multigene family.
5-imidazolinone (Ala-Gly)
                                                                                                                                                                                                                                                                                                                                                             Mismatches 258;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        (See http://www.isb-sib.ch/announce/
                                                                                                                                                                                                                                                                                                                                                                                              Length
                                                                                                                                                                                                                                                                                                                                                               Indels
                                  EFTDHLTHRLKHHPGQIEA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            restrictions
                                                                                                                                                                                                                                                                                                                                                                                               725;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             and
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             2
                                                                                                                                                                                                                                                                                                                                                               92;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             for
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            collaboration
L outstation -
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              ij
                                                                                                                                                                                                                                                                                                                                                             Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               commercia
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         from
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              no
                                                                                                                                                                                                                                 156
   391
                                    326
                                                                                                   267
                                                                                                                                 275
                                                                                                                                                                 210
                                                                                                                                                                                                217
                                                                                                                                                                                                                                                                157
                                                                                                                                                                                                                                                                                               97
```

```
RESULT
PAL3_PI
 멍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                            Appert C., Logemann E., Hahlbrock K., Schmid J., Amrhein N.;
"Structural and catalytic properties of the four phenylalanine
ammonia-lyse isoenzymes from parsley (Petroselinum crispum Nym.).";
LE Dur. J. Biochem. 225:491-499 (1994).

C.-!- FUNCTION: This is a key enzyme of plant metabolism catalyzing the
first reaction in the biosynthesis from L-phenylalanine of a wide
variety of natural products based on the phenylpropane skeleton.

C.-!- CATALYTIC ACTIVITY: L-phenylalanine = trans-cinnamate + NH(3).

C.-!- SUBCELLULAR IOCATION: Cytoplasmic (Probable).

C.-!- SUBCELLULAR IOCATION: Cytoplasmic (Probable).

Mich is formed autocatalytically by cyclization and dehydration
of residues Ala-Ser-Gly (By similarity).

C.-!- SIMILARITY: Belongs to the PAL / histidase family.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  PAL3
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Eukaryota; Viridiplantae; Streptophyta; Embryophyta; Tracheophyta; Spermatophyta; Magnollophyta; eudicotyledons; core eudicots; asterids; campanulids; Apiales; Apiaceae; Apioideae; apioid superclade; Apium clade; Petroselinum.

NCBI_TaxID=4043;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      01-NOV-1995 (Rel. 32, Created)
01-NOV-1995 (Rel. 32, Last sequence update)
10-CCT-2003 (Rel. 42, Last annotation update)
Phenylalanine ammonia-lyase 3 (EC 4.3.1.5).
                                 use by non-profit institutions as long as modified and this statement is not removed. U entities requires a license agreement (See htt or send an email to license@isb-sib.ch).
                                                                                                         This SWISS-PROT entry is copyright. It is produced through a collal between the Swiss Institute of Bioinformatics and the EMBL outs the European Bioinformatics Institute. There are no restrictions
EMBL; X81159; CAA57057.1;
                                                                                                                                                                                                                                                                                                                                                                                                                                              MEDLINE=95010141; PubMed=7925471;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              P45729;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                   SEQUENCE FROM N.A.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  PETCR
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           596
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 544
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          500
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             510
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              440
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   451
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          392 VISLEAG-QSTTDNPLIDVENKXTHHGGNFQASAVXNTMEKTRLALALIGKINFTQLTEM 450
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               327
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               XVLVKML
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GTSAIPNRIKECRSYPLYRFVREELGT----ELLTGEKVTSPGEEFDKVFTAICEGKII
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         YPLIQKLRQ---VIVDHALVNGESEKNAVTSIFHKIGAFEBELKAVLPKEVEAARAAYDN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GTVVEXLSSXXXXXVSLAAVNA-----
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             NSLALISARRTAEANDVLSLLLATHLYCVLQAVDLRAMEFEFKKQFXPXXXXXLLXQHFGX
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  VNDFYNNGLPSNLTASRNPSLDYGFKGAETAMASYCSELQYLANPVTSHVQSAEQHNQDV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             LNAGMNRGLPSCL-AAEDPSLSYHCKGLDIAAAAYTSELGHLANPVTTHVQPAEMGNQAV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        TKSIEREINSVNDNPLIDVSRNKAIHGGNFQGTPIGVSMDNTRLAIRAIGKLMFAQFSEL 439
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             AAVMEHILDGSSYMKLAQKLHEMDPLQKP-----KQDRYALRTSPQWLGPQIE--VIRYA 379
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            DPMMECL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 --TVKNTVSQVAKKVLTTGVNGELHPSRFCEKDLLKVVDREQVYTYADDP-
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    XXTXXXXXXELXXKV-------XKXLXKRL--EQTNSYDLEPRWHDAFSXAT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          NSLGLISSRKTSEAVDILKLMSTTFLVAICQAVDLRHLEENLRQ-------
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       SSSPALXYLSP-RTRVLYSFVREELGVKARRGDVFLGKQEVTIGSNVSRIYEAIKSGRIN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                STANDARD;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            714
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    718
                                                        moved. Usage by and for commercial
  (See http://www.isb-sib.ch/announce/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                ----WKVAXAEKAIS--LTRXVRXXFWXAPS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    8
                                                                                          its content
                                                                              and
                                                                                                                                     EMBL outstation
                                                                                                                                                    a collaboration
                                                                              for
                                                                                               g
                                                                                                                 9
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  659
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        612
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             543
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 569
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      499
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         718
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               652
```

```
5
                                                  Ъ
                                                                      5
                                                                                                  뫄
                                                                                                                             5
                                                                                                                                                       뭕
                                                                                                                                                                                     Ś
                                                                                                                                                                                                                   Дb
                                                                                                                                                                                                                                        8
                                                                                                                                                                                                                                                                   멍
                                                                                                                                                                                                                                                                                              Ś
                                                                                                                                                                                                                                                                                                                         дЬ
                                                                                                                                                                                                                                                                                                                                                   δõ
                                                                                                                                                                                                                                                                                                                                                                                       В
                                                                                                                                                                                                                                                                                                                                                                                                           δÃ
                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    맑
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Query Match
Best Local Similarity
Matches 264; Conser
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    TIGRPANS; TIGR01226; phe am lyase; 1.

PROSITE; PS00488; PAL HISTIDASE; 1.

Lyase; Phenylpropanoid metabolism; Multigene family.

CROSSLNK 204 206 5-imidazolinone (Ala-Gly)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      PIR; S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  SEQUENCE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Pfam; PF00221; PAL; 1.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     HSSP; P21310; 1B8F.
InterPro; IPR008948; L-Aspartase-like.
InterPro; IPR001106; Phe/His_NH31yase.
InterPro; IPR005922; Phe_am_Tyase.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             MOD_RES
 677
                                                                                                            570
                                                                                                                                     590
                                                                                                                                                                                          545
                                                                                                                                                                                                                      468
                                                                                                                                                                528
                                                                                                                                                                                                                                               485
                                                                                                                                                                                                                                                                           408
                                                                                                                                                                                                                                                                                                                                   349
                                                                                                                                                                                                                                                                                                      426
                                                                                                                                                                                                                                                                                                                                                            366
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    174
                                                                                                                                                                                                                                                                                                                                                                                        291
                                                                                                                                                                                                                                                                                                                                                                                                                    306
                                                                                                                                                                                                                                                                                                                                                                                                                                               233
                                                                                                                                                                                                                                                                                                                                                                                                                                                                           248
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                188
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            123
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     131
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  63
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             74
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  14
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        σ
                                                                                                            RVVDREYIFAYIDDPCSATYPLMQKLRE-
                                                                                                                                                                                          RAMEFEFKKOFXPXXXXLLXQHFGXXXTXXXXXXELXXKV-----
                                                                                                                                                                                                                                                                        GVSMDNTRLAIAAIGKLMFAQFSELVNDFYNNGLPSNLSGGRNPSLDYGFKGAEIAMASY
GEKVRSPGEEFEKVFTAMSKGEIIDPLLECL 707
                         GKQEVTIGSNVSRIYEAIKSGRINXVLVKML
                                                    AFEDELKALLPKEVETA-RAALESGNPAIPNRIKECRSYPLYKFVREELGT---
                                                                               XAEKAIS--LTRXVRXXFWXAPSSSSPAL--XYLSPRTRVLYSFVREELGVKARRGDVFL
                                                                                                                                       KRLEQ---
                                                                                                                                                                                                                     CSELQFLANPVTNHVQSAEQHNQDVNSLGLISSRKTSEAVEILKLMSTTFLVGLCQAIDL
                                                                                                                                                                                                                                                                                                                                                         RODRYPLRTSPOWLGPLVSDMIHAHAVLSLEAGOSTTDNPLIDVENKXTHHGGNFOASAV 425
                                                                                                                                                                                                                                                                                                                                                                                        IFAEVMQGKP-EFTDHLTHKLKHHPGQIEAAAIMEHILDGSAY-VKAAQKLHEMDPLQKP 348
                                                                                                                                                                                                                                                                                                                                                                                                              LTVEAMVGHAGSFHPFLHDVTRPHPTQIEVARNIRTLLEGSXFAVHHEEEVKVKDDEGIL
                                                                                                                                                                 RHLEENLK ---
                                                                                                                                                                                                                                        TSELGHLANPVTTHVQPAEMGNQAVNSLALISARRTAEANDVLSLLLATHLYCVLQAVDL
                                                                                                                                                                                                                                                                                                      XNTMEKTRIALIGKINFTQLTEMINAGMNRGLPSCLA-AEDPSLSYHCKGLDIAAAAY
                                                                                                                                                                                                                                                                                                                                KQDRYALRTSPQWLGPQI-EVIRSSTKMIEREINSVNDNPLIDVSRNKAIHGGNFQGSPI
                                                                                                                                                                                                                                                                                                                                                                                                                                            --TLSPEEAFKLAGVEGGFFELQPKEGLALVNGTAVGSGMASMVLFEANTLAVLAEVMSA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                      EKIMXAREATALFGLEP--VVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLSQALTA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  SGIRFEILEAITKFLNHNITPCLPLRGTITASGDLVPLSYIAGLLTGRPNSKA-VGPTGV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              SAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAITGHPDSKVHVXHEGX
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          TKQGGALQKELIRFLNAGI-----FGSGAEAGNNTLPHSATRAAMLVRINTLLQGY
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     TEDAISLOKALLEHOLOGVIPTSXDSFXLGRGLE---NSLPLEVVRGAMTIRVNSLTRGH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               LTISQVAAISARDDSGVKVELSEEARAGVKASSDWVMDSMNKGTDSYGVTTGFGATSHRR
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          LTLGDVVG-AARKGRXVRVXDSDEIRXKIDKSVEFLRXQLXNSV--YGVTTGFGGSADTR
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        NGTTNG-HANGNGLDLCMKKEDPLNWGVAAEALTGSHLDEVKRMVAE-YRKPVVKLEGET
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                NGXXNGXHAAXXASXXXXXXXXXXAXAGSXLPTTXXTQLDIVEXXLADPXTDDXXELDGYS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    718
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                205
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   S48726.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    ΑA;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              205
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    78165 MW;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        28.5%;
                                                                                                                                     ----TNSYDLEPRWHDAFSXATGTVVEXLSSXXXXXVSLAAVNAWKVA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            115;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Score 958.5; [
Pred. No. 1.2e-
15; Mismatches
                                                                                                                                                                -----STVKNTVSQVAKRVLTMGVNGELHPSRFCEKDLL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                DHĀ (2,3-DIDEHY)
(BY SIMILARITY)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           (By similarity).
DHA (2,3-DIDEHYDROALANINE)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  17786451FFDBDC35 CRC64;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           1.2e-66;
ches 285;
                                                                                                           -TIL
                                                                                                           /EHALNNGDKERNLSTSIFQKIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Length
                                                                                                                                                                                          ----XXXLX
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        718;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             87;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Gaps
                                                                                694
                                                                                                                                                                                                                      527
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             130
                                                                                                                                                                569
                                                                                                                                                                                                                                               544
                                                                                                                                                                                                                                                                          467
                                                                                                                                                                                                                                                                                                                                407
                                                                                                                                                                                                                                                                                                                                                                                                                                            290
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             247
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     187
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 122
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       62
```

RESULT

```
Ş
                                                                         밁
                                                                                             Ś
                                                                                                                      В
                                                                                                                                              5
                      B
                                                                                                                                                                          멎
                                                                                                                                                                                             δ
                                                                                                                                                                                                                         Query Match
Best Local S
Matches 252
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    P52777;
01-OCT-1996
01-OCT-1996
10-OCT-2003
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  _PALY_I
                                                                                                                                                                                                                                                                                                                        InterPro; IPR008948; L-Aspartase-like.
InterPro; IPR005106; Phe/His NH31yase.
InterPro; IPR005126; Phe_am_Tyase.
Pfam; PF00221; PAL; 1.
TIGRERMS; TIGR01226; phe_am_Tyase; 1.
PROSITE; PS00488; PAL_HISTIDASE; 1.
Lyase; Phenylpropanoid metabolism.
Lyase; Phenylpropanoid metabolism.
CROSSLNK 206 208 5-imidazolipone (Ala-Gly)
                                                                                                                                                                                                                                                                          SEQUENCE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             This SWISS-PROT entry is copyright. It is produced through a collaboration between the Swiss Institute of Bioinformatics and the EMBL outstation - the European Bioinformatics Institute. There are no restrictions on its
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 pinus taeda (Loblolly pine).
Eukaryota; Viridiplantae; Stre
Spermatophyta; Coniferopsida;
                                                                                                                                                                                                                                                                                                MOD_RES
                                                                                                                                                                                                                                                                                                                                                                                                                                        EMBL; U39792; AAA84889.1; -. PIR; T09777; T09777.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                             entities requires a license agreement (S or send an email to license@isb-sib.ch).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     use by non-profit institutions as long as its content modified and this statement is not removed. Usage by an
                                                                                                                                                                                                                                                                                                                                                                                                                             HSSP; P21310; 188F.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              SEQUENCE FROM N.A.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Phenylalanine ammonia-lyase
                                                                         175
                                                                                                187
                                                                                                                         124
                                                                                                                                                  127
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  PINTA
                                                                                                                                                                         64
                                                                                                                                                                                                 69
                                                                                                                                                                                                                                      Similarity
                                          XEKIMXAREAIALFGLE-PVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLSQALTA
                                                                                      HSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAITGHPDSKVHVXHEG
                                                                                                                         SHRRTNQGAELQKELIRFLNAGV-------LGKCPENVLSEDTTRAAMLVRTNTLLQG
                                                                                                                                                ADTRTEDAISLQKALLEHQLCGVLPTSXDSFXLGRGLENSLPLEVVRGAMTIRVNSLTRG
                                                                                                                                                                                                 LDGYSLTLGDVVGAARKGRXVRVXDSDEIRXKIDKSVEFLRXQLX--NSVYGVTTGFGGS
LTVEAMVGHAGSFHPFLHDVTRPHPTQIEVARNIRTLLEGSXFAVH----
                      IE--MSGAEALKKVGLEKPFELQPKEGLAIVNGTSVGAALASIVCFDANVLALLSEVISA
                                                                         YSGVRWDILETVEKLLNAWLTPKLPLRGTITASGDLVPLSYLAGLLTGRPNSRVR-SRDG
                                                                                                                                                                        I EGKSLTI SDVAAVARRSOVKVKLDAAAAKSRVEESSNWVLTOMTKGTDTYGVTTGFGAT
                                                                                                                                                                                                                                                                         754 AA;
                                                                                                                                                                                                                                                                                                    207
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             (Rel. 34, Created)
(Rel. 34, Last sequence update)
(Rel. 42, Last annotation update)
no ammonia-lyase (EC 4.3.1.5).
                                                                                                                                                                                                                          Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  STANDARD;
                                                                                                                                                                                                                                                                                                    207
                                                                                                                                                                                                                                                                         82600 MW;
                                                                                                                                                                                                                                      28.4%;
                                                                                                                                                                                                                          109;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Streptophyta; Embryophyta; Tracheophyta; ida; Coniferales; Pinaceae; Pinus.
                                                                                                                                                                                                                         Score 957; DB 1;
Pred. No. 1.7e-66;
9; Mismatches 258
                                                                                                                                                                                                                                                                                     (By similarity).

DHA (2,3-DIDEHYDROALANINE)

(BY SIMILARITY).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  PRT;
                                                                                                                                                                                                                                                                          59E97746AA0CA398
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  754
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      (See http://www.isb-sib.ch/announce/
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    and the EMDL .

--- no restrictions
in in
                                                                                                                                                                                                                                                Length
                                                                                                                                                                                                                                                                         CRC64;
                                                                                                                                                                                                                          Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      and
                                                                                                                                                                                                                         64;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      for commercia.
                                                                                                                                                                                                                         Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     0
                                                                                                246
                                                                                                                         174
                                                                                                                                                  186
                        291
                                                305
                                                                         233
                                                                                                                                                                          123
                                                                                                                                                                                                  126
                                                                                                                                                                                                                         18
```

```
RESULT 8
PALY_MEDS
          밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   멍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        δÃ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ś
                                                                                                                                                                                                                                                                                                                                                                                            PALY MEDSA STANDARD; PRT; 725 AA. 927990; PRT; 725 AA. 927990; PRT, 725 AA. 927990; PRT, 725 AA. 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790; PRT, 92790
This SWISS-PROT entry is copyright. It is produced through a collaboration between the Swiss Institute of Bioinformatics and the EMBL outstation the European Bioinformatics Institute. There are no restrictions on its use by non-profit institutions as long as its content is in no way modified and this statement is not removed. Usage by and for commercial entities requires a license agreement (See http://www.isb-sib.ch/announce/or send an email to license@isb-sib.ch).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Eukaryota; Viridiplantae; Streptophyta; Embryophyta; Tracheophyta; Spermatophyta; Magnoliophyta; eudicotyledons; core eudicots; rosideurosids I; Fabales; Fabaceae; Papilionoideae; Trifolieae; Medicag
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    MEDSA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       STRAIN=cv. Apollo;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             SEQUENCE FROM N.A.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            NCBI_TaxID=3879;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Medicago sativa (Alfalfa).
                                                                                                                                                                                                                                                                  PTM: Contains an active site 4-methylidene-imidazole-5-one (MIO) which is formed autocatalytically by cyclization and dehydration of residues Ala-Ser-Gly (By similarity).

SIMILARITY: Belongs to the PAL / histidase family.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  989
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  644
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   597
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      525
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       465
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   481
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        292
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    MFCEVMNGKPEFTDPLTHKL-KHHPGQMEAAAIMEYVLDGSSYMKHAAKLHEMNPLQKP-
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  EVIEVVYDAISEDKVIVPLFKCL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    MASYTSELLYLANPYTSHVQSAEQHNQDVNSLGLVSARKSAEAIDILKLMLSTYLTALCQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 AAAYTSELGHLANPVTTHVQPAEMGNQAVNSLALISARRTAEANDVLSLLLATHLYCVLQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 SNVSRIYEAIKSGRINXVLVKML 725
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               ISLTRXVRXXFWXAPSSSSPALXYLSP-RTRVLYSFVREELGVKARRGDVFLGKQEVTIG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 YIDDPCNASYPLTQKLRNILVEHAFKNAEGEKDPNTSIFNKIPVFEAELK----AQLEPQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      AVDURHLE----ENMLATVKQIVSQVAKKTLSTGLNGELLPGRFCEKDLLQVVDNEHVFS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 AVDLRAMEFEFKKQFXPXXXXXLLXQHFGXXXTXXXXXXXELXXK-VXKXLXKRLEQTN---
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GTPIGVSMDNLRLSISAIGKLMFAQFSELVNDYYNGGLPSNLSGGPNPSLDYGLKGAEIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                ASAVXNTMEKTRLALALIGKLNFTQLTEMLNAGMNRGLPSCLA-AEDPSLSYHCKGLDIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ----KQDRYGLRTSPQWLGPQVEIIRSATHMIEREI-NSVNDNPVIDVARDKALHGGNFQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     EGILRODRYPLRTSPOWLGPLVSDMIHAHAVLSLEAGOSTTDNPLIDVENKXTHHGGNFO
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   VSLÄRE-----SYDKGTSPLPDRIQECRSYPLYEFVRNQLGTK-----LLSGTRTISPG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ----SYDLEPRWHD-----AFSXATGTVVEXLSSXXXXXVSLAAVNAWKVAXAEKA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     708
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Medicago
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     421
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      702
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   643
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        464
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        636
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      580
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        596
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       524
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        349
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       685
                                                                                                                                                                                                                                                                                                                                                                                                                                                               Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    δÃ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              망
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               멍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     STITING CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREEK CREE
                                                       Ş
                                                                                                                                        뮍
                                                                                                                                                                                                   Š
                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                 8
                                                                                                                                                                                                                                                                                                                                                                                                          В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     멍
```

```
Matches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Query Match
Best Local
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           DOMAIN
SEQUENCE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              TIGRFAMS; TIGR01226; phe am lyase; 1 PROSITE; PS00488; PAL HISTIDASE; 1. Lyase; Phenylpropanoid metabolism
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       EMBL; X58180; CAA41169.1; -. PIR; S17444; S17444. HSSP; P21310; 188F.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     MOD_RES
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               CROSSLNK
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          InterPro; IPR008948; L-Aspartase-like.
InterPro; IPR001106; Phe/His NH31yase.
InterPro; IPR005922; Phe_am_lyase.
Pfam; PF00221; PAL; 1.
                                                                                                                                                                                                                                                                                                                                                                                                      449
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      336
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          167
                                                                                                                                                                                                                                                                                                                                                                                                                                               460
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       389
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                400
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     277
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           227
                                        722
                                                                                                                                                                                                                                                                                                                         509
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              262;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 4
8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      49
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Phenylpropanoi
VK 211 21
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Similarity
                                      VKML
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     LASIVLFEANILAVLSEVLSAIFAEVMQGKP-EFTDHLTHKLKHHPGQIEAAAIMEHILD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                MESNNKGTDSYGVTTGFGATSHSRTKQGGALQKELIRFLNAGIFGNGTES-----NHT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      TOLDIVEXXLADPXTDDXXELDGYSLTLGDVVGAARKGRXVRVXDSDEIRXKIDKSVEFL
                                                                                                                                                             Q---VLVDHALVNGESEKNFNTSIFQKIATFEEELKTLLPKEVESA-RTAYESGNPTI--
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     SVNDNPLIDVSRNKALHGGNFQGTPIGVSMDNTRLALASIGKLMFAQFSELVNDFYNNGL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          STTDNPLIDVENKXTHHGGNFQASAVXNTMEKTRLALALIGKLNFTQLTEMLNAGMNRGL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            MATLALHDAHMLSLLSQALTALTVEAMVGHAGSFHFFLHDVTRPHPTQIEVARNIRTLLE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   LPKTATRAAMLVRINTLLQGYSGIDFEILEAITKPLNKTVTPCLPLRGTITASGDLVPLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         RXQLXNSV - - YGVTTGFGGSADTRTEDAISLQKALLEHQLCGVLPTSXDSFXLGRGLENS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 SHLDEVKRMVAE-YRKPVVRLGGETLTISQVAAIAAHDHGVQVDLSESARDGVKASSEWV
LECL 714
                                                                                                                                                                                                SXXXXXVSLAAVNA-------WKVAXAEKAIS--LTRXVRXXFWXAPSSSSPALXY
                                                                                                                                                                                                                                          SVKNTVSQVAKKTLTMGVNGELHPSRFCEKDLLKVVDREHVFAYIDDPCSÄTYPLSQKLR
                                                                                                                                                                                                                                                                                                                         KTNEAIEILQLMSSTFLIALCQAIDLRHLEENLKN-----------
                                                                                                                                                                                                                                                                                                                                                                RTAEANDVLSLLLATHLYCVLQAVDLRAMEFEFKKQFXPXXXXLLXQHFGXXXXTXXXXXX
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      GSSYVKAAKKLHEIDPLQKP----KODRYALRTSPQWLGPLVE--VIRFSTKSIEREIN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             GSXFAVH----HEEEVKVKDDEGILRQDRYPLRTSPQWLGPLVSDMIHAHAVLSLEAG-Q
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    YIAGLLTGRPNSK---AHGPSGEVLNAKEAFNLAGINAEFFELQPKEGLALVNGTAVGSG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         YIAAAITGHPDSKVHVXHEGXEKIMXAREAIALFGL--BPVVLGPKEGLGLVNGTAVSAS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     LPLEVVRGAMTIRVNSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLS
                                                                              -- PNKINGCRSYPLYKFVREELGT-----GLLTGENVISPGEECDKLFSAMCQGKIIDPL
                                                                                                                                                                                                                                                                                 ELXXKVXKXLXKRLEQTNSYDLEP-----
                                                                                                                                                                                                                                                                                                                                                                                                        PSNLSASRNPSLDYGFKGAEIAMASYCSELQYLANPVTTHVQSAEQHNQDVNSLGLISAR
                                                                                                                                                                                                                                                                                                                                                                                                                                  PSCL-AAEDPSLSYHCKGLDIAAAAYTSELGHLANPVTTHVQPAEMGNQAVNSLALISAR
                                                                                                                     LSP-----RTRVLYSFVREELGVKARRGDVFLGKQEVTIGSNVSRIYEAIKSGRINXVL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           24
725 AA;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Conservative 106;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       212
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       212
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         27 F
78865 MW;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               28.4%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            5-imidazolinone (Ala-Gly)
(By similarity).
DHA (2,3-DIDEHYDROALANINE)
(BY SIMILARITY).
POLY-ASN.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Score 954; DB 1;
Pred. No. 2.8e-66;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               19906A2575F64D7D CRC64;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Mismatches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         ۲.
                                                                                                                                                                                                                                                                                   ---RWH-----DAFSXATGTVVEXLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Length 725;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                104;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Gaps
                                                                                                                                                                                                                                                                                                                                                                    578
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           166
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   106
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         448
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           388
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    159
                                                                                                                                                                                                                                                 603
                                                                                                                                                                                                                                                                                     620
                                                                                                                                                                                                                                                                                                                              543
                                                                                                                                                                                                                                                                                                                                                                                                             508
                                                                                                                                                                                                                                                                                                                                                                                                                                                   518
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  459
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 399
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          335
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                344
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         276
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             284
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     219
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            226
                                                                                                                           721
```

```
RESULT 9
PAL1_ORYSA
                                     밁
                                                                 Ş
                                                                                              밁
                                                                                                                      5
                                                                                                                                                                                                                 Matches
                                                                                                                                                                       Query Match
Best Local
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                ammonia-lyase from rice plants.";

Bur. J. Biochem. 185:19-25(1989)

-!- FUNCTION: This is a key enzyme of plant metabolism catalyzing the first reaction in the biosynthesis from L-phenylalanine of a wide variety of natural products based on the phenylpropane skeleton.

-!- CATALYTIC ACTIVITY: L-phenylalanine = trans-cinnamate + NH(3).

-!- PANTWAY: Phenylpropanoid biosynthesis; first step.

-!- SUBCELULAR LOCATION: Cytoplasmic (Probable).

-!- PTM: Contains an active site 4-methylidene-imidazole-5-one (MIO), which is formed autocatalytically by cyclization and dehydration of residues Ala-Ser-Gly (By similarity).

-!- SIMILARITY: Belongs to the PAL / histidase family.
                                                                                                                                                                                                                 SEQUENCE
                                                                                                                                                                                                                                                                    InterPro; IPR008948; L-Aspartase-like.
InterPro; IPR001106; Phe/His NH3]Yase.
InterPro; IPR001202; Phe_am_lyase.
Pfam; PP00221; PAL; 1.
TIGRERAMS; TIGR01226; Phe_am_lyase; 1.
PROSITE; PS00488; PAL_HISTIDASE; 1.
PROSITE; PS00488; PAL_HISTIDASE; Multigene Lyase; Phenylpropanoid metabolism; Multigene CROSSLNK 189 191 5-imidazolinone
                                                                                                                                                                                                                                                                                                                                                                                   EMBL; X16099; CAA34226.1;
HSSP; P21310; 1B8F.
Gramene; P14717; -.
                                                                                                                                                                                                                                                                                                                                                                                                                                        modified and this statement is not removed. entities requires a license agreement (See or send an email to license@isb-sib.ch).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               This
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       STRAIN=cv. Nipponbare;
MEDLINE=90032676; PubMed=2806257;
Minami E., Ozeki Y., Matsucka M., Koizuka N., Tanaka
"Structure and some characterization of the gene for
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         PAL1 ORYSA P14717;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 the
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Eukaryota; Viridiplantae; Streptophyta; E
Spermatophyta; Magnoliophyta; Liliopsida;
Ehrhartoideae; Oryzeae; Oryza.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Oryza sativa
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               01-APR-1990 (Rel.
01-APR-1990 (Rel.
10-OCT-2003 (Rel.
                                                                                                                                                                                                                                          MOD_RES
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  between
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     SEQUENCE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Phenylalanine
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 European
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                SWISS-PROT entry is copyright. It is produced through een the Swiss Institute of Bioinformatics and the EVEUTOPEAN BIOINFORMATICS Institute. There are no resti
                 156
                                                                                                                                                          254;
                                           75
                                                                                                 16
                                                                                                                             40
                                                                                                                                                                       Similarity
SPXLGRGLENSLPLEVVRGAMTIRVNSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGT
                                         RPRVKASSEWILTCIAHGGDIYGVTTGFGGTSHRRTKDGPALQVELLRYLNAGIFGTGSD
                                                                 RXKIDKSVEFLRXQLXN--SVYGVTTGFGGGSADTRTEDAISLQKALLEHQLCGVLFTSXD
                                                                                                                             GSXLPTTXXTQLDIVEXXLADPXTDDXXELDGYSLTLGDV--VGAARKGRXVRVXDSDEI
                                                                                                 GAAAAEMAGSHLDEVKRMVAQ-FREPLVKIQGATLRVGQVAAVAQAKDAARVAVELDEEA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      FROM N.A.
                                                                                                                                                                                                               701
                                                                                                                                                          Conservative
                                                                                                                                                                                                                                            190
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       (Rice)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Rel. 14, Created)
Rel. 14, Last sequence up
Rel. 42, Last annotation
ammonia-lyase (EC 4.3.1.
                                                                                                                                                                                                               AA;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        STANDARD;
                                                                                                                                                                                                                                          190
                                                                                                                                                                                                               75808
                                                                                                                                                                       28.3%;
35.9%;
                                                                                                                                                        117;
                                                                                                                                                                                                                 ¥.
                                                                                                                                                       Score 952.5; I
Pred. No. 3.5e-
17; Mismatches
                                                                                                                                                                                                                          (By similarity).
DHA (2,3-DIDEHYD
(BY SIMILARITY).
                                                                                                                                                                                                               2BF9ADF0BC8E04DE
                                                                                                                                                                                                                                         3-DIDEHYDROALANINE)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             update)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   update)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       701
                                                                                                                                                                                                                                                                                                                                                                                                                                                       (See http://www.isb-sib.ch/announce,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           There are no restrictions
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Embryophyta; Tracheophyta;
a; Poales; Poaceae;
                                                                                                                                                                       .5e-66;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        A
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 as its content
                                                                                                                                                                                     B
                                                                                                                                                        266;
                                                                                                                                                                                                                                                                    family.
(Ala-Gly)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Usage
                                                                                                                                                                                Ļ
                                                                                                                                                                                                               CRC64;
                                                                                                                                                                                  Length
                                                                                                                                                        Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                     γď
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Y.;
phenylalanine
                                                                                                                                                                                                                                                                                                                                                                                                                                                                     and
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             EMBL outstation
                                                                                                                                                                                                                                                                                                                                                                                                                                                            7 10 to 1
                                                                                                                                                     71;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               ք
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  collaboration
6 outstation -
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  'n
                                                                                                                                                       Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                      commercia
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    g the wide
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     8
                                           134
                                                                                                 74
                                                                                                                             97
```

```
밁
                                                                               δ
B
                      S
                                                                                                                   밁
                                                                                                                                         Š
                                                                                                                                                                              밁
                                                                                                                                                                                                       Ś
                                                                                                                                                                                                                                                                 Ś
                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                              B
                                                                                                                                                                                                                                                                                                                                                                                                                                                 S
                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                         S
                                                                                                                                                                                                                                                                                                                                                                                       Ş
                                                                                                                                                                                                                                                                                                                                                                                                                         B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           片
                           671
                                                       597
                                                                                      627
                                                                                                                    538
                                                                                                                                                 570
                                                                                                                                                                               478
                                                                                                                                                                                                                                           418
                                                                                                                                                                                                                                                                      451
                                                                                                                                                                                                                                                                                                    358
                                                                                                                                                                                                                                                                                                                                 392
                                                                                                                                                                                                                                                                                                                                                               303
                                                                                                                                                                                                                                                                                                                                                                                           334
                                                                                                                                                                                                                                                                                                                                                                                                                         244
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    187
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 216
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              135
                                                                                                                                                                                                                                                                                                                                                                                                                       AIVNGTSVGSALAATVMFDANILAVLSEVLSAVFCEVMNGKPEYTDHLTHKL-KHHPGSI
RSFPLYRFVREELGC-----
                    RTRVLYSFVREELGVKARRGDVFL-GKQEVTIGSNVSRIYEAIKSGRI
                                                                                                                    NPTGDLSSARFSEKNLLTAIDR-EAVFSYADDPCSANYPLMQKLRAVLVEHALTSGDRRA
                                                                                                                                                                                                            NSLALISARRTAEANDVLSLLLATHLYCVLQAVDLRAMEFEFKKQFXPXXXXLLXQHFGX
                                                                                                                                                                                                                                                              LNAGMNRGLPSCLA-AEDPSLSYHCKGLDIAAAAYTSELGHLANPVTTHVQPAEMGNQAV
                                                                                                                                                                                                                                                                                                                                                               DAÄAIMEHILAGSSFMSHAK---KVNEMDPLLKPKODRYALRTSPOWLGPQI-QVIRA-A
                                                                                                                                                                                                                                                                                                                                                                                                                                                      GLVNGTAVSASMATLALHDAHMLSLLSQALTALTVEAMVGHAGSFHPFLHDVTRPHPTQI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              G-----HTLPSETVRAAMLVRINTLLQGYSGIRFEILEAITKLLNTGVTPCLPLRGT
                                                       RGLRVLQDHQVRGG
                                                                                    VSLAAVNAWKVAXAEKAISLITRXVRXXFWXAPSSSSP--------
                                                                                                                                               XXTXXXXXXELXXKVXXXXXXKRLEQTNSYDLEP--RWHDAFSXATGTVVE-XLSSXXXXX
                                                                                                                                                                              NSLGLVSARKTLEAVDILKLMTSTYIVALCQAVDLRHLEENIKSSVKNCVTQVAKKVLTM
                                                                                                                                                                                                                                         VNEFYNNGLTSNLAGSRNPSLDYGFKGTEIAMASYSSELQYLANPITNHVQSAEQHNQDV
                                                                                                                                                                                                                                                                                                      TKSIEREVNSVNDNPVIDVHRGKALHGGNFQGTPIGVSMDNARLAIANIGKLMFAQFSEL
                                                                                                                                                                                                                                                                                                                               VLSLEAG-QSTTDNPLIDVENKXTHHGGNFQASAVXNTMEKTRLALALIGKLNFTQLTEM
                                                                                                                                                                                                                                                                                                                                                                                           EVARNIRTLIEGSXFAVHHEEEVKVKDDEGIL--RQDRYPLRTSPQWLGPLVSDMIHAHA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    ITASGDLVPLSYIAGLITGRPNAQA-ISPDGRK--VDAAEAFKLAGIEGGFFTLNPKEGL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ISASGDLSPLSYIAAAITGHPDSKVHVXHEGXEKIMXAREAIALFGLEP--VVLGPKEGL
-VFLTGEKLKSPGEECNKVFLGISQGKL
                                                       APLCAAPGDRGRPRRRRQRTAPVANRIVES
682
                           717
                                                                                      ASTAXTE
                                                                                                                    596
                                                                                                                                                 626
                                                                                                                                                                                                              569
                                                                                                                                                                                                                                           477
                                                                                                                                                                                                                                                                       509
                                                                                                                                                                                                                                                                                                      417
                                                                                                                                                                                                                                                                                                                                 450
                                                                                                                                                                                                                                                                                                                                                                                            391
                                                                                                                                                                                                                                                                                                                                                                                                                                                      333
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               186
                                                                                                                                                                               537
                                                                                                                                                                                                                                                                                                                                                               357
                                                                                                                                                                                                                                                                                                                                                                                                                           302
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    243
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 273
```

```
RESULT
PALY TR
 PALY_Y
                                                                                                                                                                                  SEQUENCE FROM N.A.
SEQUENCE FROM N.A.
STRAIN=cv. Karridale; TISSUE=Leaf;
MEDLINE=94171061; PubMed=8125321;
Howles P.A., Arioli T., Weinman J.J.;
"Characterization of a phenylalanine ("Characterization of a phenylalanine ("Characterization subterraneum.";
                                                                                                                                                                                                                                                                                                                                                                                                      01-NOV-1995
01-NOV-1995
10-OCT-2003
                                                                                                              in Trifolium subterraneum.";

Gene 138:87-92(1994)

FUNCTION: This is a key enzyme of plant metabolism catal

first reaction in the biosynthesis from L-phenylalanine

variety of natural products based on the phenylpropane s

-i- CATALITIC ACTIVITY: L-phenylalanine = trans-cinnamate +
 This
                                                                                                                                                                                                                                                                                                             Trifolium Subterraneum (Subterranean clover).
Eukaryota; Viridiplantae; Streptophyta; Ebrayophyta; Spermatophyta; Magnoliophyta; endicotyledomb; core evenosids I; Fabales; Fabaceae; Papilionoideae; Trifol
                                                                                                                                                                                                                                                                                              NCBI_TaxID=3900;
                                                                                                                                                                                                                                                                                                                                                                                      Phenylalanine
                                                                                                                                                                                                                                                                                                                                                                                                                                                  P45734;
                         PATHWAY: Phenylpropanoid biosynthesis; first step. SUBCELLULAR LOCATION: Cytoplasmic (Probable). PTM: Contains an active site 4-methylidene-imidazole-which is formed autocatalytically by cyclization and of residues Ala-Ser-Gly (By similarity). SIMILARITY: Belongs to the PAL / histidase family.
 SWISS-PROT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                  TRISU
                                                                                                                                                                                                                                                                                                                                                                                                      Rel. 32, (Rel. 32, 32) (Rel. 32, 42,
                                                                                                                                                                                                                                                                                                                                                                                        ammonia-lyase
                                                                                                                                                                                                                                                                                                                                                                                                                                                                STANDARD;
 entry
                                                                                                                                                                                                                                                                                                                                                                                     Created)

Last sequence update)

Last annotation update)

-lyase (EC 4.3.1.5).
 S
 copyright.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                  PRT;
 끍
                                                                                                                                                                                                          ammonia-lyase
                                                                                                                                                                                                                                                                                                                                                                                                                                                                  725
 ı.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                  B
produced
                                                                                                                                                                                                                                                                                                               ophyta; Tracheophyta;
  core eudicots; rosids;
; Trifolieae; Trifolium
 through
                                                                                                                                                                                                          multigene
                                                                                                                                                              catalyzing
                                                        -5-one (MIO)
dehydration
                                                                                                                   ne of a wid
e skeleton.
+ NH(3).
 ա
 collaboration
                                                                                                                                                                                                          family
                                                                                                                                                 wide
```

```
Matches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Query Match
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      InterPro; IPR008948; L-Aspartase-like.
InterPro; IPR001106; Phe/His NH31yase.
InterPro; IPR005922; Phe_am_Tyase.
Pfam; PF00221; PAL; 1.
TIGRFAMS; TIGR01226; phe_am_Tyase; 1.
PROSITE; PS00488; PAL_HISTIDASE; 1.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              between the Swiss Institute of Bioinformatics and the EMBL outstation - the European Bioinformatics Institute. There are no restrictions on its use by non-profit institutions as long as its content is in no way modified and this statement is not removed. Usage by and for commercial entities requires a license agreement (See http://www.isb-sib.ch/announce/or send an email to license@isb-sib.ch).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     PROSITE; PS00488; PAL HISTIDASE; 1.

Lyase; Phenylpropanoid metabolism; Multigene family.

CROSSLNK 211 213 5-imidazolinone (Ala-Gly)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            EMBL; M91192; AAA17993.1; -. HSSP; P21310; 1B8F.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           SEQUENCE
                                                                                                                                                                                                  591
                                                                                                                                                                                                                                                 602
                                                                                                                                                                                                                                                                                                                                                                                                    472
                                                                                                                                                                                                                                                                                                                                                                                                                                                      482
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        412
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    423
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      354
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        364
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       296
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         304
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      236
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          126
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         68
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           69
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Similarity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GHSAVRLVVLEALINFLNHGITPIVPLRĞTISASGDLSPLSYIAAAITGHPDSKVHVXHE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     ILRODRYPLRTSPOWIGPIVSDMIHAHAVLSLEAG-OSTTDNPLIDVENKXTHHGGNFOA 422
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   PSGEMLNAKEAFQLAGINAEFFELQPKEGLALVNGTAVGSGLASIVLFEANILAVLSEVL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           GXEKIMXAREAIALFGL--EPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLSQAL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          GYSGIRFEILEAITKLLNNNITPCLPLRGTITASGDLVPLSYIAGLLTGRSNSK---AHG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       SADTRTEDAISLOKALLEHOLCGVLPTSXDSFXLGRGLENSLPLEVVRGAMTIRVNSLTR
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         LGGETLTISQVAAIAAHDGATVEL--SESARAGVKASSDWVMESMNKGTDSYGVTTGFGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        LDGYSLTLGDVVG-AARKGRXVRVXDSDEIRXKIDKSVEFLRXQLXNSV--YGVTTGFGG 125
LFTAMCQGKIIDPLLKCL
                                                 IYEAIKSGRINXVLVKML
                                                                                              EVESARTAYENGNSTIANKINGCRSYPLYKFVREELGT----SLLTGERVISPGEECDK
                                                                                                                                                XVRXXFWXAPSSSSPALXYLSP-RTRVLYSFVREELGVKARRGDVFLGKQEVTIGSNVSR
                                                                                                                                                                                                                                              PRWHDAFSXATGTVVEXLSSXXXXXVSLAAVNA-----
                                                                                                                                                                                                                                                                                                   IDLRHLEENLKNSVKNTVSQVAKKTLTIGVSGELHPSRFCEKDLLKVVDR-EHVFSYIDD
                                                                                                                                                                                                                                                                                                                                               VDLRAMBFEFKKQFXPXXXXXLXQHFGXXXTXXXXXXELXXKVXXXXLXKRLEQTNSYDLE
                                                                                                                                                                                                                                                                                                                                                                                                    ASYCSELQYLANPVTTHVQSAEQHNQDVNSLGLISSRKTKEAIEILQLMSSTFLIALCQA
                                                                                                                                                                                                                                                                                                                                                                                                                                                   AAYTSELGHLANPVTTHVQPAEMGNQAVNSLALISARRTAEANDVLSLLLATHLYCVLQA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        TPIGVSMDNTRLALASI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  SAVXNTMEKTRLALALIGKLNFTQLTEMLNAGMNRGLPSCL-AAEDPSLSYHCKGLDIAA 481
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      KPKQDRYALRTSPQWLGPLIE--VIRFSTKSIEREINSVNDNPLIDVSRNKALHGGNFQG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          SAIFAEVMQGKP-EFTDHLTHKLKHHPGQIEAAAIMEHILHGSAY-VKDAKKLHEMDPLQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       TALTVEAMVGHAGSFHFFLHDVTRPHFTQIEVARNIRTLLEGSXFAVHHEEEVKVKDDEG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        TSHRRTKQGGALQKELIRFLNAGIFGNGTES-----NHTLPHTATRAAMLVRINTLLQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           725
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             212
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           AA;
                                                                                                                                                                                            -CSATYPLAQKLRO---VLVDHALVNGESEKNSNTSIFQKIATFEEELKTLLPK
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             212
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           78998 MW;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  28.2%;
37.2%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        108;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        GKLLFAQFSELVNDFYNNGLPSNLSASRNPSLDYGFKGSEIAM 471
                                                 725
  714
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Score 949; DB 1; Length Pred. No. 6.7e-66;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                (By similarity).
DHA (2,3-DIDEHYDROALANINE)
(BY SIMILARITY).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           70F9925C86622240 CRC64;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Mismatches
                                                                                                                                                                                                                                            ----WKVAXAEKAIS--LTR
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           245
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            125
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          185
                                                                                                                                                                                                    641
                                                                                                                                                                                                                                                    648
                                                                                                                                                                                                                                                                                                   590
                                                                                                                                                                                                                                                                                                                                                  601
                                                                                                                                                                                                                                                                                                                                                                                                    531
                                                                                                                                                                                                                                                                                                                                                                                                                                                      541
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           411
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          353
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           295
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          303
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           178
```

망양

유성

뭉

8 8 8

8

맑

Ş

8

멼

94 B 95 B

밁

```
PALLIPULY
ID PALLI PRU
AC 064963;
DT 30-MAY-2
DT 30-MAY-2
DT 30-MAY-2
DT 30-MAY-2
DT 30-MAY-2
DT 30-MAY-2
DT 30-MAY-2
DT 30-MAY-2
DT 30-MAY-2
DT 30-MAY-2
DT 30-MAY-2
DT 30-MAY-2
DT 10-COTTAIN
RAT (In) Pla
RAT (In) Pla
RAT Sweet Ch
RA Wiersma
RAT (In) Pla
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC -!- SUBN
CC 
                                   Ş
                                                                                                밁
                                                                                                                                            Ş
                                                                                                                                                                                                   멼
                                                                                                                                                                                                                                               Š
                                                                                                                                                                                                                                                                                                            Query Match
Best Local S
Matches 250
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       EMBL; AF036948; AAC78457.1; -.
HSSP; P21310; 1B8F.
InterPro; IPR008948; L-Aspartase-like.
InterPro; IPR001106; Phe/His_NH31yase.
InterPro; IPR005122; Phe_am_lyase.
Pfam; PF00221; PAL; 1.
TIGREAMS; TIGR01226; Phe_am_lyase; 1.
PR0SITE; PS00448; PAL HSTIDASE; 1.
PROSITE; PS00448; PAL HSTIDASE; 1.
Lyase; Phenylpropanoid metabolism; Multigene far CROSSLNK 203 205 5-imidazolinone (A
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              30-MAY-2000 (Rel. 39, Created)
30-MAY-2000 (Rel. 39, Last Sequence update)
10-CCT-2003 (Rel. 42, Last annotation update)
Phenylalanine ammonia-lyase 1 (EC 4.3.1.5).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                This SWISS-PROT entry is copyright. It is produced through a collaboration between the Swiss Institute of Bioinformatics and the EMBL outstation the European Bioinformatics Institute. There are no restrictions on it use by non-profit institutions as long as its content is in no was modified and this statement is not removed. Usage by and for commercial entities requires a license agreement (See http://www.isb-sib.ch/announce or send an email to license@isb-sib.ch).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Eukaryota; Viridiplantae; Streptophyta; Embryophyta; Tracheophyta;
Spermatophyta; Magnoliophyta; eudicotyledons; core eudicots; rosids;
eurosids I; Rosales; Rosaceae; Amygdaloideae; Prunus.
                                                                                                                                                                                                                                                                                                                                                                                                                    SEQUENCE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                   MOD_RES
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      "A full-length cDNA for phenylalanine ammonia-lyase cloned from
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Wiersma P.A., Wu
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               STRAIN=cv.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    NCBI_TaxID=42229;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Prunus avium (Cherry).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           SEQUENCE FROM N.A.
                                                                                                                                                                                                                                                                                                              Local Similarity
les 250; Conserv
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                PRUAV
                                                                                                     90
                                                                                                                                                                                                                                                             40
                                                                                                                                                                                                           GVAAETLKGSHLDEVKRMVAE-YRKPVVKLGGESLTISQVAAIATHDSGVKVELSESARA
                                                                                                                                                                                                                                                     GSXLPTTXXTQLDIVEXXLADPXTDDXXELDGYSLTLGDVVGAARKGRXVRVXDSDEIRX
                                                    XLGRGLENSLPLEVVRGAMTIRVNSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTIS
                                                                                                   GVKASSDWVMDSMSKGTDSYGVTTGFGATSHRRTKQGAALQKELIRFLNAGVFGSTKES-
                                                                                                                                                    KIDKSVEFLRXQLXNSV--YGYTTGFGGSADTRTEDAISLQKALLEHQLCGVLFTSXDSF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Summit;
                                                                                                                                                                                                                                                                                                                                                                                                                       717 AA;
                                                                                                                                                                                                                                                                                                              Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                           204
-GHTLPHQATRAAMLVRINTLLQGYSGIRFEILEVIIKFLNNNVTPCLBLRGTIT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   STANDARD;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                           204
                                                                                                                                                                                                                                                                                                                                                                                                                          77999
                                                                                                                                                                                                                                                                                                         28.1%; Sco
35.8%; Pro
ative 112;
                                                                                                                                                                                                                                                                                                                                                                                                                       MW;
                                                                                                                                                                                                                                                                                                            Score 947; DB
Pred. No. 9.5e
12; Mismatches
                                                                                                                                                                                                                                                                                                                                                                                                                                                (By similarity).

DHA (2,3-DIDEHYDROALANINE)

(BY SIMILARITY).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   PRT;
                                                                                                                                                                                                                                                                                                                                                                                                                          B84DF90FA0BF60B3 CRC64;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   717
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            noved. Usage by and for commercial (See http://www.isb-sib.ch/announce/
                                                                                                                                                                                                                                                                                                              DB 1; I
).5e-66;
les 285;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     A
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             family.
(Ala-Gly)
                                                                                                                                                                                                                                                                                                                                                                Length 717;
                                                                                                                                                                                                                                                                                                                 Indels
                                                                                                                                                                                                                                                                                                                 52;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       collaboration
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ripe
                                                                                                                                                                                                                                                                                                                 Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           wide
                                                       217
                                                                                                                                                                                                              9
     202
                                                                                                                                                                                                                                                                  99
```

```
Petroselinum crispum (Parsley) (Petroselinum hortense).
Eukaryota; Viridiplantae; Streptophyta; Embryophyta; Tracheophyta;
Spermatophyta; Magnoliophyta; eudicotyledons; core eudicots; aster:
campanulids; Apiales; Apiaceae; Apioideae; apioid superclade;
Apium clade; Petroselinum.
NCBI_TaxID=4043;
                                                                                                                                                                                                                                                                "A phenylalanine ammonia-lyase gene from pareley: structure, regulation and identification of elicitor and light responsicis-acting elements.";
                                 Schuster B., Retey J.;
"Serine-202 is the putative precursor of the active site
dehydroalanine of phenylalanine ammonia lyase. Site-directed
mutagenesis studies on the enzyme from parsley (Petroselinum
f.)"
                                                                                                                  ACTIVE SITE, AND MUTAGENESIS OF SER-203 MEDLINE=94326930; PubMed=8050576;
                                                                                                                                                                      SEQUENCE FROM N.A.
Kang X., Logemann B., Hahlbrock K.;
Submitted (SEP-1996) to the EMBL/GenBank/DDBJ databases.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      01-MAR-1992 (Rel. 21, Created)
01-MAR-1992 (Rel. 21, Last sequence update)
10-OCT-2003 (Rel. 42, Last annotation update)
Phenylalanine ammonia-lyase 1 (EC 4.3.1.5).
                                                                                                                                                                                                                                                                                                                                     MEDLINE=89356635; PubMed=2767049;
Lois R., Dietrich A., Hahlbrock K.,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            VREELG-----AEYLTGEKVRSPGEECDKVFTAICEGKI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         TKSIERBIDSVNDNPLIDVSRNKALHGGNFQGTPIGVSMDNTRLAIASIGKLMFAQFSEL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             AGGDLVPLSYIAGMLTGRPNSKA-VGPDG--QTLSAAEAFEFVGINSGFFELQPKEGLAL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             VREELGVKARRGDVFLGKQEVTIGSNVSRIYEAIKSGRI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   NGENEKNASTSIFQKIVAFEEELKVLLPKEVDŚARAALDSGŚAGVPNRITECRSYPLYKF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            AAVNAWKVAXA--EKAISLTRXVRXXFWXAPSSSSPALXYLSP--
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  LTTGVNGELHPSRFCEKDLLKVVDREYVF----AYIDDPCSATYPLMQKLRQVLVEHALT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      XXTXXXXXXELXXKVXKXLXKRLEQTNSYDLEPRWHDAFSXATGTVVEXLSSXXXXXVSL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        NSLALISARRTAEANDVLSLLLATHLYCVLQAVDLRAMEFEFKKQFXPXXXXLLXQHFGX
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          VNDFYNNGLPSNLSGGRNPSLDYGFKGAEIAMASYCSELQFLANPVTNHVQSAEQHNQDV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               VLSLEAG-QSTTDNPLIDVENKXTHHGGNFQASAVXNTMEKTRLALALIGKLNFTQLTEM
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           VNGTAVSASMATLALHDAHMLSLLSQALTALTVEAMVGHAGSFHPFLHDVTRPHPTQIEV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  LNAGMNRGLPSCLA-AEDPSLSYHCKGLDIAAAAYTSELGHLANPVTTHVQPAEMGNQAV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       AAIMEHILDGSSYVKAAKKLHEQDPLQKP-----KQDRYALRTSPQWLGPQIE--VIRYS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          ARNIRTLLEGSXFAVH----HEBEVKVKDDEGILRQDRYPLRTSPQWLGPLVSDMIHAHA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    VNGTAVGSGLASTVLFDTNILALLSEILSAIFAEVNQGKP-EFTDHLTHKLKHHPGQIEA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        ASGDLSPLSYIAAAITGHPDSKVHVXHEGXEKIMXAREAIALFGLEP--VVLGPKEGLGL
      349:252-254(1994)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            PRT;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            716
                                                                                                                                         AND
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            B
                                                                                                                                         SER-210
                                         crispum
                                                                                                                                                                                                                                                                                                                                                                                                                                                                               asterids;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          -RTRVLYSF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     664
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            678
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    604
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               548
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       569
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            491
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  509
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 450
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            391
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            431
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    318
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       371
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 259
                                                            밁
                                                                                       Ş
                                                                                                                                       밁
                                                                                                                                                                    Ś
                                                                                                                                                                                                              뫄
                                                                                                                                                                                                                                                      Š
                                                                                                                                                                                                                                                                                               멂
                                                                                                                                                                                                                                                                                                                               8
                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     맑
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Best Loca
Matches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Query Match
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                MUTAGEN
MUTAGEN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       This SWISS-PROT entry is copyright. It is produced through a collaboration between the Swiss Institute of Bioinformatics and the EMBL outstation the European Bioinformatics Institute. There are no restrictions on its use by non-profit institutions as long as its content is in no way modified and this statement is not removed. Usage by and for commercial entities requires a license agreement (See http://www.isb-sib.ch/announce/or send an email to license@isb-sib.ch).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           EMBL; X15473; CAA33500.1; -. EMBL; X16772; CAA34715.1; -. EMBL; Y07654; CAA68938.1; -. PIR; S04463; S04463.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               SEQUENCE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      MOD_RES
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        PROSITE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Pfam;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Lyase;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   TIGRFAMS; TIGR01226; phe_am_lyase; PROSITE; PS00488; PAL_HISTIDASE; 1
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          InterPro; IPR008948; L-Aspartase-like.
InterPro; IPR001106; Phe/His NH31yase.
InterPro; IPR005922; Phe_am_lyase.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            HSSP;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Local
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 FUNCTION: This is a key enzyme of plant metabolism catalyzing the first reaction in the biosynthesis from L-phenylalanine of a wide variety of natural products based on the phenylpropane skeleton. CATALYTIC ACTIVITY: L-phenylalanine = trans-cinnamate + NH(3). PATHWAY: Phenylpropanoid biosynthesis; first step.

SUBCELLULAR IOCATION: Cytoplasmic (Probable).

SUBCELLULAR IOCATION: Cytoplasmic (Probable).

PTM: Contains an active site 4-methylidene-imidazole-5-one (MIO), which is formed autocatalytically by cyclization and dehydration of residues Ala-Ser-Gly (By similarity).

SIMILARITY: Belongs to the PAL / histidase family.
                      464
                                                            384
                                                                                               404
                                                                                                                                       326
                                                                                                                                                                               344
                                                                                                                                                                                                                  267
                                                                                                                                                                                                                                                          284
                                                                                                                                                                                                                                                                                                  210
                                                                                                                                                                                                                                                                                                                                     226
                                                                                                                                                                                                                                                                                                                                                                             150
                                                                                                                                                                                                                                                                                                                                                                                                                  166
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 108
                                                                                                                                                                                                                                                                                                                                                                                                                                                          99
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       40
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               49
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             PF00221; PAL; 1.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          P21310; 1B8F
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Phenylpropanoid metabolism; Multigene TK 202 204 5-imidamali---
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Similarity
A-AEDPSLSYHCKGLDIAAAAYTSELGHLANPVTTHVQPAEMGNQAVNSLALISARRTAE
                                                        EGSXFAVHHEEEVKVKDDEGILRQDRYPLRTSPQWLGPLVSDMIHAHAVLSLEAGQSTTD
                                                                                                                                                                                                                                                  SMATLALHDAHMLSLLSQALTALTVEAMVGHAGSFHPFLHDVTRPHPTQIEVARNIRTLL
                                                                                                                                                                                                                                                                                               SYIAGLLTGRPNSKA-VGPTGV--ILSPEEAFKLAGVEGGFFELQPKEGLALVNGTAVGS
                                                                                                                                                                                                                                                                                                                                                                                               SLPLEVVRGAMTIRVNSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPL
                                                                                                                                                                                                                  GMASMVLFEANILAVLAEVMSAIFAEVMQGKP-EFTDHLTHKLKHHPGQIEAAAIMEHIL
                                                                                                                                                                                                                                                                                                                                                                           TLPHSATRAAMLVRINTLLQGYSGIRFEILEAITKELNQNITPCLPLRGTITASGDLVPL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             LRXQLXNSV--YGVTTGFGGSADTRTEDAISLQKALLEHQLCGVLPTSXDSFXLGRGLEN
                                                                                                                                         DGSAY-VKAAQKLHEMDPLQKPKQDRYALRTSPQWLGPQI-EVIRSSTKMIEREINSVND
                                                                                                                                                                                                                                                                                                                                     SYIAAAITGHPDSKVHVXHEGXEKIMXAREAIALFGLEP--VVLGPKEGLGLVNGTAVSA
                                                                                                                                                                                                                                                                                                                                                                                                                                                          VMDSMNKGTDSYGVTTGFGATSHRRTKQGGALQKELIRFLNAGI-----FGNGSDN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       SHLDEVKKMVAE-YRKPVVKLGGETLTISQVAAISARDGSGVTVELSEAARAGVKASSDW
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        TQLDIVEXXLADPXTDDXXELDGYSLTLGDVVG-AARKGRXVRVXDSDEIRXKIDKSVEF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                203
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          203
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             AA;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             203
210
77828
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          203
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   28.1%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              110;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Ξ
Σ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Score 946.5; DB 1;
Pred. No. le-65;
0; Mismatches 286;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              S->A: COMPLETE LOSS OF ACTIVITY S->A: NO LOSS OF ACTIVITY.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         (By similarity).
DHA (2,3-DIDERYDROALANINE)
(BY SIMILARITY).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             23D82FA1AC6FBB4A CRC64;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      DB 1;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              family.
(Ala-Gly)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        716;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  43;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Gaps
```

밁

665 679 605 630 549 570 492 510 432 451 372 392 319 336 260 276 203

PAL1\_PETCR P24481;

STANDARD;

성 음 성

유 성

뮍 Ş 유 성

Вb Ś Дb 8 Ъ Ş В

8:1641-1648(1989).

403

325 343 266 283

443 463 383 165

98 107

225 149

209

Lett.

SEQUENCE FROM N.A.

```
PAL2
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          망
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              ă
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 g
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           RESULT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           P45728;
01-NOV-1995 (Rel. 3
01-NOV-1995 (Rel. 3
10-OCT-2003 (Rel. 4
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Appert C., Logemann E., Hahlbrock K., Schmid J., Amrhein N.;
"Structural and catalytic properties of the four phenylalanine
ammonia-lyase isoenzymes from parsley (Petroselinum crispum Nym.).";
Eur. J. Biochem. 225:491-499(1994).

-i. FUNCTION: This is a key enzyme of plant metabolism catalyzing the
first reaction in the biosynthesis from L-phenylalanine of a wide
variety of natural products based on the phenylpropane skeleton.
-i. CAPALYTIC ACTIVITY: L-phenylalanine = trans-cinnamate + NH(3).
-i. PATHMAY: Phenylpropanoid biosynthesis; first step.
-i. SUBCELLULAR LOCATION: Cytoplasmic (Probable).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Eukaryota; Viridiplantae; Streptophyta; Embryophyta; Tracheophyta; Spermatophyta; Magnoliophyta; eudicotyledons; core eudicots; aster campanulids; Apiales; Apiaceae; Apioideae; apioid superclade; Apium clade; Petroselinum.
                                                                                                                                                                                                                                                            This SWISS-PROT entry is copyright. It is produced through a collaboration between the Swiss Institute of Bioinformatics and the EMBL outstation - the Buropean Bioinformatics Institute. There are no restrictions on its use by non-profit institutions as long as its content is in no way modified and this statement is not removed. Usage by and for commercial entities requires a license agreement (See http://www.isb-sib.ch/announce/or send an email to license@isb-sib.ch).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                           ++++
                                 InterPro; IPR008948; L-Aspartase-like.
InterPro; IPR008106; Phe/His NH31yase.
InterPro; IPR005102; Phe_am_Tyase.
Pfam; PF00221; PAL; 1.
PIGRRAMS; TIGR01226; Phe_am_1yase; 1.
PROSITE; PS00488; PAL HISTIDASE; 1.
PROSITE; PS00488; PAL HISTIDASE; 1.
Lyase; Phenylpropanoid metabolism; Multigene
CROSSLNK 202 204 5-inidazolinone
                                                                                                                                                                                                                                                                                                                                                                                                                    ---
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                MEDLINE=95010141; PubMed=7925471;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      SEQUENCE FROM N.A.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Petroselinum crispum (Parsley) (Petroselinum hortense)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Phenylalanine
                                                                                                                                                                                                                            EMBL; X81158; CAA57056.1; -.
                                                                                                                                                                                                                                                                                                                                                                                                            PTM: Contains an active site 4-methylidene-imidazole-5-one (MIO) which is formed autocatalytically by cyclization and dehydration of residues Ala-Ser-Gly (By similarity).

SIMILARITY: Belongs to the PAL / histidase family.
                                                                                                                                                                                         $48725; $48725.
; P21310; 1B8F.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       PETCR
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   673
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       693
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          623
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    564
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              LTGEKVTSPGEEFEKVFIAMSKGEIIDPLLECL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          EDELKALLPKEVESA-RAALESGNPAI----PNRIEECRSYPLYKFVRKELGT----EY
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      KVXKXLXKRLEQTNSYDLEP--RWHDAFSXATGTVVEXLSSXXXXXVSLAAVNAWKVAXA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            AVEILKLMSTTFLVGLCQAIDLRHLEENLKSTVKNTVSSVAKRVLTMGVNGELHPSRFCE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   SGGRNPSLDYGFKGAEIAMASYCSELQFLANPVTNHVQSAEQHNQDVNSLGLISSRKTSE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     FLGKQEVTIGSNVSRIYEAIKSGRINXVLVKML 725
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            EKAIS--LTRXVRXXFWXAPSSSSPALXYLSP-----RTRVLYSFVREELGVKARRGDV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    KDLLRVVDR-EYIFAYIDDPCSATYPLMQKLRQTLVEHALKNGDNERNLSTSIFQKIATF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            ammonia-lyase
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         STANDARD;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          32, Created)
32, Last sequence update)
42, Last annotation update)
onia-lyase 2 (EC 4.3.1.5).
 (By
DHA
                                       5-imidazolinone (Ala-Gly)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           PRT;
   similarity)
(2,3-DIDEH)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           A
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     705
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  563
```

```
RESULT 14
PAL1_SOYBN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  SS
                                                                                                                                                                                                                                                                                                                      밁
                                                                                                                                                                                                                                                                                                                                               Ş
                                                                                                                                                                                                                                                                                                                                                                             망
                                                                                                                                                                                                                                                                                                                                                                                                   S
                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                           Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            5
RRN OCCOMENTACE
                                                                                                                                                                                                                                                                                        Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Query Match
Best Local :
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Matches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     SEQUENCE
                                                                                                                         PALI SOYBN STANDARD; PRT; 713 AA. P27991; 927991; 01-AUG-1992 (Rel. 23, Created) 01-AUG-1992 (Rel. 23, Last sequence update) 10-OCT-2003 (Rel. 42, Last annotation update) phenylalanine ammonia-lyase 1 (EC 4.3.1.5).
                                                     Eukaryota; Viridiplantae; Streptophyta; Embryophyta; Tracheophyta; Spermatophyta; Magnoliophyta; eudicotyledons; core eudicots; rosideurosids I; Fabales; Fabaceae; Papilionoideae; Phaseoleae; Glycine
                                                                                                 Glycine max (Soybean)
                SEQUENCE FROM N.A.
                                         NCBI_TaxID=3847;
  STRAIN=cv.
                                                                                                                                                                                                                                                                                                                                                                                                          578
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           444
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      464
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  384
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             404
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         326
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     344
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                267
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          284
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     210
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           150
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        108 LRXQLXNSV--YGVTTGFGGSADTRTEDAISLQKALLEHQLCGVLFTSXDSFXLGRGLEN 165
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             254;
                                                                                                                                                                                                                                                                                                                                                     617
                                                                                                                                                                                                                                                                                                                                                                                564
                                                                                                                                                                                                                                                                                                                         624
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       40
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 49 TOLDIVEXXLADPXTDDXXELDGYSLTLGDVVG-AARKGRXVRVXDSDEIRXKIDKSVEF 107
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Similarity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     SLPLEVVRGAMTIRVNSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPL
                                                                                                                                                                                                                                                                                                                                                                              KDLLREVDREYIFAYIDDPCSATYPLMQKLRQTLVEHALKNGDNERNMNTSIFQKIATFE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      A-AEDPSLSYHCKGLDIAAAAYTSELGHLANPVTTHVQPAEMGNQAVNSLALISARRTAE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 NPLIDVSRNKAIHGGNFQGTPIGMSMDNTRLAIAAIGKLMFAQFSELVNDFYNNGLPSNL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  NPLIDVENKXTHHGGNFQASAVXNTMEKTRLALALIGKLNFTQLTEMLNAGMNRGLPSCL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    EGSXFAVHHEEEVKVKDDEGILRQDRYPLRTSPQWLGPLVSDMIHAHAVLSLEAGQSTTD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GMASMVLFEANILAVLAEVMSAIFAEVMQGKP-EFTDHLTHKLKHHPGQIEAAAIMEHIL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         SMATLALHDAHMLSLLSQALTALTVEAMVGHAGSFHPFLHDVTRPHPTQIEVARNIRTLL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     SYTAGLLTGRPNSKA-VGPTGV--ILSPEBAFKLAGVEGGFFELQPKEGLALVNGTAVGS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 SYIAAAITGHPDSKVHVXHEGXEKIMXAREAIALFGLEP--VVLGPKEGLGLVNGTAVSA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         VMDSMNKGTDSYGVTTGFGATSHRRTKQGGALQKELIRFLNAGI-----
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      SHLDEVKKMVAE-YRKPVVKLGGETLTISQVAAISARDGSGVTVELSEAARAGVKASSDW
                                                                                                                                                                                                                                                                                                                          DELK---
                                                                                                                                                                                                                                                                                                                                                                                                          XELXXKVXKX-------LXKRLEQT-----NSYDLEFRWHDAFSXATGTVV
                                                                                                                                                                                                                                                                                                                                                                                                                                     AVBILKLMSTTFLVGLCQAIDLRHLEENLKSTVKNTVSSVAKRVLTMGVNGELHPSRFCE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ANDVISILIATHLYCVLQAVDLRAMEFEFKKQFXPXXXXLLXQHF-----
                                                                                                                                                                                                                                                                                                                                                     EXLSSXXXXVSLAAVNAWKVAXAEKAISLTRXVRXXFWXAPSSSSPALXYLSP-----
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           SGGRNPSIDYGFKGAETAMASYCSELQFLANPVTNHVQSAEQHNQDVNSLGLTSSRKTSE
                                                                                                                                                                                                                                                                                              RTRVLYSFVREELGVKARRGDVFLGKQEVTIGSNVSRIYEAIKSGRINXVLVKML
                                                                                                                                                                                                                                                                    RSYPLYKFVRKELGI ----EYLTGEKVTSPGEEFDKVFIÅMSKGEIIDPLLECL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     716 AA;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Conservative
    TISSUE=Leaf
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     77964 MW;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           28.1%;
                                                                                                                                                                                                                                                                                                                          -----ALLPKEVESAR-----AALESGNPAI----PNRIEEC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Score 946.5; 1
Pred. No. 1e-6
LO; Mismatches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   (BY SIMILARITY).
F74D7BD881BEEE66 CRC64;
                                                                                                                                                                                                   713
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1e-65
                                                                                                                                                                                                   À
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 264;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 87;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                    -GXXXTXXXXX
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    --- FGNGSDN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Gaps
                                                                                                                                                                                                                                                                          705
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     283
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           225
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       149
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            98
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         403
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                343
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           266
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                209
                                                                                                                                                                                                                                                                                                                                                                                                                616
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        443
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   463
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               383
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    325
                                                                                                                                                                                                                                                                                                                                                         670
                                                                                                                                                                                                                                                                                                                                                                                     623
                                                                                                                                                                                                                                                                                                                                                                                                                                           563
                                                                                                                                                                                                                                                                                                                                                                                                                                                                       577
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 503
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            522
                                                                                                                                                                                                                                                                                                                                655
```

```
Query Match
Best Local S
Matches 271
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               PIR; S22991; S22991
PIR; S22991; S22991
HSSP; P21310; 1B8F.
InterPro; IPR008948; L-Aspartase-like.
InterPro; IPR001106; Phe/His NH31yase.
InterPro; IPR005922; Phe_am_lyase.
Pfam; PF00221; PAL; 1.
TIGRFAMs; TIGR01226; phe_am_lyase; 1.
PROSITE; PS00488; PAL HISTIDASE; 1.
Lyase; Phenylpropanoid metabolism; Multigene far CROSSINK 199 201 5-imidazolinone (A)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     use by non-profit institutions as long modified and this statement is not remove entities requires a license agreement (s or send an email to license@isb-sib.ch).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           This SWI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   SEQUENCE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         f Mu
c Local v
271;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          EMBL; X52953; CAA37129.1; PIR; S22991; S22991.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        MEDLINE=92190550; PubMed=1799682; Frank R.L., Vodkin L.O.; "Sequence and structure of a phen
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Glycine max."
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           N Seq. 1:335-346 (1991).

FUNCTION: This is a key enzyme of plant metabolism catalyzing the first reaction in the biosynthesis from L-phenylalanine of a widd variety of natural products based on the phenylpropane skeleton. CATALYTIC ACTIVITY: L-phenylalanine = trans-cinnamate + NH(3).

PATHWAY: Phenylpropanoid biosynthesis; first step.

SUBCELLULAR LOCATION: Cytoplasmic (Probable).

SUBCELLULAR is an active site 4-methylidene-imidazole-5-one (MIO), which is formed autocatalytically by cyclization and dehydration of residues hla-Ser-Gly (By similarity).

SIMILARITY: Belongs to the PAL / histidase family.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 European
                                                                                         364
                                                                                                                                                                                   308
                                                                                                                                                                                                                           228
                                                                                                                                                                                                                                                                                                                     171
       423
                                                                                                                                                                                                                                                                                                                                                             190
                                                                                                                                                                                                                                                                                                                                                                                                        120
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        SWISS-PROT entry is copyright. It is produced through a collaboration een the Swiss Institute of Bioinformatics and the EMBL outstation - Buropean Bioinformatics Institute. There are no restrictions on its by non-profit institutions as long as its content is in no way fied and this statement is not removed. Usage by and for commercial ties requires a license agreement (See http://www.isb-sib.ch/announce/
                                                                                                                                                                                                                                                                                                                                                                                                                                                     132
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          74
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               14
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ຫ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Similarity
                                     --KQDRYALRTSPQWLGPLIE--VIRFSTKSIEREINSVNDNPLIDVSRNKALHGGNFQG
                                                                                ILRQDRYPLRTSPQWLGPLVSDMIHAHAVLSLEAG-QSTTDNPLIDVENKXTHHGGNFQA
                                                                                                                                                                                                                                                                                                                                                    VRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAITGHPDSKVHVXHEGXEK
                                                                                                                                                                                                                                                                                                                                                                                                                                           EDAISLOKALLEHOLCGVLPTSXDSFXLGRGLENS--LPLEVVRGAMTIRVNSLTRGHSA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                LTLGDVVGAARKGRXVRVXDSDEIRXKIDKSVEFLRXQLXNSV--YGVTTGFGGSADTRT
SAVXNTMEKTRLALALIGKLNFTQLTEMLNAGMNRGLPSCL-AAEDPSLSYHCKGLDIAA
                                                                                                                                                                          VEAMVGHAGSFHPFLHDVTRPHPTQIEVARNIRTLLEGSXFAVH----HEEEVKVKDDEG
                                                                                                                                                                                                                                                                 IMXAREAIALFGL--EPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLSQALTALT
                                                                                                                                                                                                                                                                                                                                                                                                     KQGGALQKELIRFLNAGI------
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           LTIAQVAAVAGHDHGVAVELSESAREGVKASSEWVMNSMNNGTDSYGVTTGFGATSHRRT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                NGHONGSFCLSTAKGNNDPLNWGAAA----EAMKGSHLDEVKRMVAE-YRKPVVRLGGET
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          NGXXNGXHAAXXASXXXXXXXXXAXAGSXLPTTXXTQLDIVEXXLADPXTDDXXELDGYS
                                                                                                                               ABVMQGKP-EFTDHLTHKLKHHPGQIBAAAIMEHILDGSSYMKAAKKLHEIDPLQKP---
                                                                                                                                                                                                                           VLNAKEAFELASINSEFFELOPKEGLAL
                                                                                                                                                                                                                                                                                                              IRFEILEAITKLLNNNVTPCLDLRGTITASGDLVPLSYIAGLLTGRPNSKA-VGPSG--E
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 713 AA;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              200
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           200
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               77744
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 28.1%;
36.6%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         105;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 MΨ,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Pred. No. 1.1e.
5; Mismatches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Score 946; DB 1;
Pred. No. 1.1e-65;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 (By similarity).

DHA (2,3-DIDEHYDROALANINE)

(BY SIMILARITY).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      phenylalanine ammonia-lyase gene
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               9D71EF1CC230216A CRC64;
                                                                                                                                                                                                                                                                                                                                                                                                   FGNGTESSHTLPHTATRAMLVRINTLLQGYSG
                                                                                                                                                                                                                    VNGTAVGSGLASMVLFEANILAVLSEVLSAIF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         293;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    family.
(Ala-Gly)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       72;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 g the wide
                                                                                     422
                                                                                                                                                                                                                                                                                                            227
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   131
                                                                                                                                 343
                                                                                                                                                                                                                                                                                                                                                         249
                                                                                                                                                                                                                       287
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        119
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                59
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     맑
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             ₽.
```

SPITTER REPRESENTATION OF THE PROPERTY OF THE

```
647
                                                                                                                                                                577
                                                                                                                                                                                                                                                 520
                                                                                                                                                                                                       000
                                                                                                                                                                                                                                                                                                                                 460
                                                                                                                                                                                                                                                                                                                                                                        482
                                                                                                                                                                                                                                                                                                                                                                                                               400
FDKLFTAMCQGKIIDPLMECL
                                       VSRIYEAIKSGRINXVLVKML
                                                                                                                                                                                                       LEPRWHDAFSXATGTVVEXLSSXXXXXVSLAAVNA
                                                                                                                                                                                                                                                                                 VDLRAMEFEFKKQFXPXXXXLLXQHFGXXXTXXXXXXELXXKVXKXLXKRL--EQTNSYD
                                                                                                                                                                                                                                                                                                                           ASYCSELQYLANPVTTHVQSAEQHNQDVNSLGLISSRKTNEAIBILKLMSSTFLIALCQA
                                                                                                                                                                                                                                                                                                                                                       AAYTSELGHLANPVTTHVQPAEMGNQAVNSLALISARRTAEANDVLSLLLATHLYCVLQA 541
                                                                                                                                                                                                                                                                                                                                                                                                         TPIGVSMDNTRLALASIGKLMFAQFSELVNDFYNNGLPSNLTASRNPSLDYGFKGAEIAM
                                                                              PKEVEGA-RAAYESGKAAIPNKIQECRSYPLYKFVREELGT--
                                                                                                                     TRXVRXXFWXAPSSSSPAL--XYLSPRTRVLYSFVREELGVKARRGDVFLGKQEVTIGSN
                                                                                                                                                                                                                                            IDLRHLEENLKNSVKNTVSQVSKR----ILTTGVNGELHPSRFCEKDLLKVVDREYIFSYI
                                                                                                                                                            -CSATYPLMQKLRQ---VLVDHALVNAECEKDVNSSIFQKIAIFEEELKNLL
  702
                                                                                                                                                                                                                                                                                                                                                                                                                                 <u>..</u>
::
                                                                                                                                                                                                     ------WKVAXAEKAIS--L
                                                                                -GLLTGEKVRSPGEE
                                                                                                                     704
                                                                                                                                                            627
                                                                                                                                                                                                     646
                                                                                                                                                                                                                                          576
                                                                                                                                                                                                                                                                                                                             519
                                                                                                                                                                                                                                                                                                                                                                                                           459
```

```
RESULT 15
PALL A ARAITH
ID ARAITH
ID 16-OCT
DT 16-OCT
DT 16-OCT
DT 10-OCT
RA WINCKE
RA WINCKE
RA WINCKE
RA WINCKE
RA WINCKE
RA WINCKE
RA WINCKE
RA WINCKE
RA WINCKE
RA WINCKE
RA WINCKE
RA WINCKE
RA WINCKE
RA WINCKE
RA WINCKE
RA WINCKE
RA WAYET
RA COOKE
RA MAYET
RA MONIO
RA MAYET
RA MONIO
RA PIEUS
RA PIEUS
RA PIEUS
RA FIESE
RA FIESE
RA WINCKE
RA WINCKE
RA WATAN
RA WINCKE
RA WATAN
RA WINCKE
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA WATAN
RA
                                                                                                                                                                                                      RC STRAIRCCV. Columbia;
RX MEDLINE=21016720; PubMed=11130713;
RX MEDLINE=21016720; PubMed=11130713;
RX Salanoubat M., Lemcke K., Rieger M., Ansorge W., Unseld M.,
Salanoubat M., Lemcke K., Rieger M., Mache R., Puigdomenech P.,
RA Fartmann B., Valle G., Bloecker H., Perez-Alonso M., Obermaier B.,
RA Delseny M., Boutry M., Grivell L.A., Mache R., Puigdomenech P.,
RA Delseny M., Boutry M., Grivell L.A., Mache R., Puigdomenech P.,
RA Wincker P., Cattolico L., Weissenbach J., Saurin W., Quetier P.,
RA Wincker P., Cattolico L., Weissenbach J., Saurin W., Quetier F.,
RA Wincker P., Cattolico L., Weissenbach J., Saurin W., Quetier F.,
RA Wincker P., Cattolico L., Weissenbach J., Bangert S.,
RA Wincker P., Colledo L., Erfle H., Jordan N., Bangert S.,
RA Wincker P., Contack H., Forle H., Jordan N., Bangert S.,
RA Wincker P., Colledo C., Perez-Perez A., Chehnert T.-H., Nordslek G.,
RA Weezi A., D'Angelo M., Pallavicini A., Toppo S., Simionati B.,
RA Conrad A., Hornischer K., Kauer G., Lehnert T.-H., Nordslek G.,
RA Reichelt J., Scharfe M., Schoen O., Bargues M., Terol J., Climent J.,
RA Reichelt J., Scharfe M., Schoen O., Bargues M., Terol J., Climent J.,
RA Reichelt J., Scharfe M., Schoen O., Bargues M., Tellon J., Jenkins J.,
RA Rooney T., Laudie M., Berger-Llauro C., Purnelle B., Masuy D.,
RA Mannhaupt G., Haase D., Schoof H., Rudd S., Zaccaria P., Mewes H.-W.,
RA Rooney T., Riazo M., Walts A., Utterback T., Fujii C.Y., Shea T.P.,
RA Rooney T., Riazo M., Walts A., Utterback T., Fujii C.Y., Shea T.P.,
RA Paiger C.M., Kaneko T., Nakaraki A., Wahashima K., Kaneko T., Nakaraki A., Shippo S., Takeuchi C., Wada T.,
RA Kiyokawa S., Nakazaki N., Shippo S., Takeuchi C., Wada T.,
Fah'iana M., Washaa S., Takeuchi C., Wada T.,
Fah'iana M., Washaa S., Sanda M., Yasuda M., Tabata S.,
Fah General M., Sanda M., Yasuda M., Tabata S.,
Fah Palar M., Sanda M., Yasuda M., Tabata S.,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345;
Q9S345
                                                         Nature 408:820-822(2000).
                                                                                                                                                                             "Sequence and analysis of thaliana.";
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     SEQUENCE FROM
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                ARATH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        N.A.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                STANDARD;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                707
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                3
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     rosids;
```

Ş 문 5 뮍 Ş В Ş

is a ke

ey enzyme of plant biosynthesis from

metabolism catalyzing L-phenylalanine of a w

유

밁 δõ Дb Ş В Ş

```
Matches 252;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Query Match
Best Local 9
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             This SWISS-PROT entry is copyright. It is produced through a collaboration between the Swiss Institute of Bioinformatics and the EMBL outstation the European Bioinformatics Institute. There are no restrictions on its use by non-profit institutions as long as its content is in no way modified and this statement is not removed. Usage by and for commercial entities requires a license agreement (See http://www.isb-sib.ch/announce/or send an email to license@isb-sib.ch).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ----
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          EMBL; AC009400; AAF02809.1; --
HSSP; P21310; 1B8F.
InterPro; IPR009948; L-Aspartase-like.
InterPro; IPR001106; Phe/His_NH31yase.
InterPro; IPR005922; Phe_am_lyase.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       SEQUENCE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        MOD_RES
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Pfam; PF00221; PAL; 1.
TIGREAMS; TIGR01226; phe am lyase; 1.
PROSITE; PS00488; PAL HISTIDASE; 1.
Lyase; Phenylpropanoid metabolism; Multigene family.
Lyase; Phenylpropanoid metabolism; Multigene family.
CROSSINK 194 196 5-imidazolinone (Ala-Gly)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          variety of natural products based on the phenylpropane skeleton. CAPALYTIC ACTIVITY: L-phenylalanine = trans-cinnamate + NH(3). PATHWAY: Phenylpropanoid biosynthesis; first step.
SUBCELLULAR LOCATION: Cytoplasmic (Probable).
PMM: Contains an active site 4-methylidene-imidazole-5-one (MIO), which is formed autocatalytically by cyclization and dehydration of residues Ala-Ser-Gly (By similarity).
SIMILARITY: Belongs to the PAL / histidase family.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    217
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  158
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          182
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            123
                                                                                                                                                                                                                                                                                              388
                                                                                                                                                                                                                                                                                                                                                                                                                                                                       357
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  275
   596 NSYDLEP---
                                                                                                                                                                            448
                                                                                                                                                                                                                                                                                                                                                     417
                                                                                                                                                                                                                                                                                                                                                                                                                334 LQXP-----KQDRYALRTSPQWLGPQI-EVIRAATKMIEREINSVNDNPLIDVSRNKALH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   45
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           65 DXXELDGYSLTLGDVVGAARKGRXVRVXDSDEIRXKIDKSVEFLRXQLXNSV--YGVTTG 122
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Similarity
                                                                                                                                                                                                                          GLDIAAAAYTSELGHLANPVTTHVQPAEMGNQAVNSLALISARRTAEANDVLSLLLATHL 535
                                                                                                                                                                                                                                                                                                                                               GGNFQASAVXNTMEKTRLALALIGKLNFTQLTEMLNAGMNRGLPSCLA-AEDPSLSYHCK 475
                                                                                                                                                                                                                                                                                                                                                                                                                                                              KVKDDEGILRQDRYPLRTSPQWLGPLVSDMIHAHAVLSLBAGQSTTDNPLIDVENKXTHH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  TLLOGYSGIRFEILEAITKLLNHEITPCLPLRGTITASGDLVPLSYIAGLLTGRPNSKA-
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         FGGSADTRTEDAISLOKALLEHOLCGVLPTSXDSFXLGRG-LENSLPLEVVRGAMTIRVN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   EAVKLGGETLTIGQVAAVARGGGGSTVELAEEARAGVKASSEWVMESMNRGTDSYGVTTG 104
                                                          VALCQAVDLRHLEENLKKAVKSAVSQVAKRVLTVGANGELHPSRFTERDVLQVVDR-EYV 566
                                                                                                                 GGNFQGTPIGVAMDNSRLAIASIGKLMFAQFSELVNDFYNNGLPSNLSGGRNPSLDYGFK
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               EVMSAMFAEVMOGKP-EFTDHLTHKLKHHPGQIEAAAIMEHILDGSSYVKEAQLLHEMDP 333
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      QALTALTVEAMVGHAGSFHEFLHDVTRPHPTQIEVARNIRTLLEGSXFA----VHHEEEV 356
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    VGPSG--ETLTASEAFKLAGVSSFFELQPKEGLALVNGTAVGSGLASTVLFDANILAVLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        VXHEGXEKIMXAREAIALFGLEPVV-LGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS 300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       SUTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAITGHPDSKVH 241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              FGATSHRRTKQGGALQNELIRFLNAGI-----FGPGAGDTSHTLPKPTTRAAMLVRVN
                                                                                                                                                                            GABIAMASYCSELQFLANPVINHVQSAEQHNQDVNSLGLISSRKTAEAVDILKLMSTTYL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               28.0%; Score 943.5; DB 1; Length 707; nilarity 37.0%; Pred. No. 1.7e-65; Conservative 98; Mismatches 282; Indels 49
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    707 AA;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 195
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 195
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       76919 MW;
----RWHDAFSXATGTVVEXLSSXXXXXVSLAAVNAWKVAXAEKAIS 645
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    (By similarity).
DHA (2,3-DIDEHYDROALANINE)
(BY SIMILARITY).
B67743C941B50B9B CRC64;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           49;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                387
                                                                                                                        595
                                                                                                                                                                                  507
                                                                                                                                                                                                                                                                                                 447
                                                                                                                                                                                                                                                                                                                                                                                                                                                                             416
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    274
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       157
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           16;
```

밁

장 음 장

B

8 B

유 성 유 성 유

정 음 성 음

Search completed: September 9, 2004, 10:04:42 Job time : 19.5685 secs

, .					
			;		
		1.0			
			×		
	·				¥
			4,		
		Ŷ			
			14.0		
				sla.	

```
Minimum DB
Maximum DB
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Title:
Perfect score:
Sequence:
                                                                                                                                                                                                                                                                                                           Database :
                                                                                                                                                                                                                                                                                                                                      Post-processing: Minimum Match 0%
Maximum Match 100%
Listing first 45 summaries
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Searched:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      OM protein - protein search, using sw model
                                                                                                                                                                                                                                                                                                                                                                                                                                                             Total number of hits satisfying chosen parameters:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Scoring table:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Run on:
                                                                                                                                                                                                                                                                                                                                                                                                             seq length: 0 seq length: 2000000000
                                                                                                                                                                               SPTREMBL 25:*

1: sp_archea:*
2: sp_bacteria:*
3: sp_fungl:*
4: sp_human:*
5: sp_morertebrate:*
6: sp_mammal:*
7: sp_mhc:*
8: sp_mhc:*
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              BLOSUM62
Gapop 10.0 , Gapext 0.5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   US-09-939-408A-21
3365
1 MAPSIDSIATSXANGXXNGX......RIYEATKSGRINXVLVKMLA 726
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   September 9, 2004, 09:57:28 ; Search time 88.3651 Seconds (without alignments) 2592.269 Million cell updates/sec
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1017041 segs, 315518202 residues
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           GenCore version 5.1.6
Copyright (c) 1993 - 2004 Compugen Ltd.
sp_organelle:*
sp_phage:*
sp_plant:*
sp_virus:*
sp_vorrebrate:*
sp_vorrebrate:*
sp_rvirus:*
sp_bacteriap:*
sp_bacteriap:*
                                                                                                                                                                                                                                                                                                                                                                                                                                                                  1017041
```

Pred. No. is the number of results predicted by chance to have a score greater than or equal to the score of the result being printed, and is derived by analysis of the total score distribution.

ຜ
Ş
宮
吕
ñ
Ħ
S

Result No.	Score	Query Match	Query Match Length DB	DB	H	Description
, , , ,	969	α	725	10	Q94AN1	Q94an1 arabidopsis
N	967	28.7	711	10	Q8W2E4	45
ω	965.5	28.7	707	10	Q7X7G3	Q7x7g3 oryza sativ
4	963	28.6	671	10	Q84VE0	
ហ	958.5	28.5	703	10	Q8VXG7	Q8vxg7 zea mays (m
6	955	28.4	711	10	Q9AXI5	Q9axi5 pharbitis n
7	955		730	10	Q9M567	Q9m567 rubus idaeu
œ	954		708	10	Q94EN0	Q94en0 rehmannia g
9	944.5		681	10	QBRUZ3	Q8ruz3 pinus sylve
10	944.5		715	10	Q852S1	Q852s1 daucus caro
11	943.5		681	10	QBSAS6	. Q8sas6 pinus sylve
12	942.5	28.0	716	10	Q9MAX1	Q9max1 catharanthu
13	941.5	28.0	681	10	QBRV49	Q8rv49 pinus sylve
14	940	27.9	717	10	QBRWP4	Q8rwp4 arabidopsis
15	939	27.9	713	10	Q8GZR8	Q8gzr8 lactuca sat
16	937.5	27.9	681	10	OBSAS7	Q8sas7 pinus sylve

45	44	43	42	41	40	39	38	37	36	35	34	ω	32	3	30	29	28	27	26	25	24	23	22	22	0	19	8	17
96	20	604.5	12	703	715	717	735	736.5	763	868.5	œ	892.5	9	9	895.5	898.5	900		910		914	15.		19.	N			w
	7	ω.	œ	0	۲.		μ,	۲	'n	5	9	9	σ.	٥,	٥.	٥.	٥.	26.9	7	7.	.7	7	7.	.7	.7	7	7.	,7
435	436	475	497	363	362	380	532	544	396	618	619	619	715	703	718	549	ნ წ	712	717	714	711	714	727	727	687	721	716	710
10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Q9M3U1	10		004869	Q9FUI8	Q9FUI7	Q84UZ7	081647	Q9FT38	Q8VWP6	Q9FS00	9H6	Q39545	024266	Q84L12	Q9XFX6	004876	Q9XGR3	Q94F89	Q8H6W0	Q8H6V6	Q8H6V5	Q7X6M8	Q7XJC4	<b>Q7</b> ХJС3	Q94F90	Q9XFX5	77	Q94C45
Q9m3u1	Q9lep1	004875	004869	Q9fui8	Q9fui7	Q84uz7	081647	Q9ft38	9dwn80	C	w	U	9	84]	X,	487	Q9xgr3	4	Q8h6w0	8he	Q8h6v5	Q7x6m8	Q7xjc4	ŽXj	Q94f90	9xf	Q9atn7	Q94c45
7	Ď,	,_		rubus :	rubus :	gin	capsic	വ	beta vulgar	dianthus ca	coffea came	cucumis mel	Ĭ.	phalaenopsi	citrus clem	hordeum vul	vigna ungui	manihot esc	coffea cane	populus tre	populus tre		pinus pinas			citrus clem	agastache r	manihot esc

## ALIGNMENTS

```
Ô
                                              밁
                                                                                           Ş
                                                                                                                                  В
                                                                                                                                                                                   Š
                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                               5
                                                                                                                                                                                                                                                                                                                                Β̈́
                                                                                                                                                                                                                                                                                                                                                                                  Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                           B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                             δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               pb
Db
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       멍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           REMBL; BT003330; AAC59949-1; -.

REMBL; BT003330; AAC59949-1; -.

REMBL; BT003330; AAC59949-1; -.

REMBL; AV079363; AAL55094-1; -.

REMBL; AV303128; AAL55094-1; -.

REMBL; AV303128; AAL559438-1; -.

REMBL; AV303128; AAL559438-1; -.

REMBL; G84787; G84787.

REMBL; G84787; G84787.

REMBL; AV303128; AAL59438-1; IEA.

REGO; GC:0016821; F:ammonia ligase activity; IEA.

REGO; GC:0016841; F:ammonia-lyase activity; IEA.

REGO; GC:0006559; P:bhosynthesis; IEA.

REGO; GC:0006559; P:bhosynthesis; IEA.

REGO; GC:0006559; P:bhosynthesis; IEA.

REGO; GC:0006559; P:bhosynthesis; IEA.

REGO; GC:0006559; P:bhosynthesis; IEA.

REGO; GC:0006559; P:bhosynthesis; IEA.

REGO; GC:0006559; P:bhosynthesis; IEA.

REGO; GC:0006559; P:bhosynthesis; IEA.

REGO; GC:0006559; P:bhosynthesis; IEA.

REGO; GC:0006559; P:bhosynthesis; IEA.

REGO; GC:0006559; P:bhosynthesis; IEA.

REGO; GC:0006559; P:bhosynthesis; IEA.

REGO; GC:0006559; P:bhosynthesis; IEA.

REGO; GC:0006559; P:bhosynthesis; IEA.

REGO; GC:0006559; P:bhosynthesis; IEA.

REGO; GC:0006559; P:bhosynthesis; IEA.

REGO; GC:0006559; P:bhosynthesis; IEA.

REGO; GC:0006559; P:bhosynthesis; IEA.

REGO; GC:0006559; P:bhosynthesis; IEA.

REGO; GC:0006559; P:bhosynthesis; IEA.

REGO; GC:0006559; P:bhosynthesis; IEA.

REGO; GC:0006559; P:bhosynthesis; IEA.

REGO; GC:0006559; P:bhosynthesis; IEA.

REGO; GC:0006559; P:bhosynthesis; IEA.

REGO; GC:0006559; P:bhosynthesis; IEA.

REGO; GC:000659; P:bhosynthe
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Query Match
Best Local Similarity
Matches 258; Conserv
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Cochrane F.C., Kim M.R., Cardenas C.L., Davin L.B., Lewis N.G., "Putative PAL multigene family in Arabidopsis thaliana: Kinetic Characterization of Recombinant Proteins and Knock-out Mutant
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Toriumi M., Yu G., Brooks S., Chao Q., Chen H., Karlin-Neumann G., Kim C., Lam B., Miranda M., Nguyen M., Palm C.J., Shinn P., Southwick A., Davis R.W., Ecker J.R., Theologis A.; "Arabidopsis Open Reading Frame (ORF) Clones."; "Arabidopsis Open Reading Frame (ORF) Clones."; Submitted (FEB-2002) to the EMBL/GenBank/DDBJ databases.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Submitted (MAY-2003) to the
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Characterization.
                                                                                                                                                                                              451
  570
                                                                                                                                               440
                                                                                                                                                                                                                                               380
                                                                                                                                                                                                                                                                                              392
                                                                                                                                                                                                                                                                                                                                                327
                                                                                                                                                                                                                                                                                                                                                                                            336
                                                                                                                                                                                                                                                                                                                                                                                                                                                268
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               276
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              211
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             218
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            157
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             158
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              100
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            98
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          39
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            40
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    XXTXXXXXXELXXKV-
                                                                                        NSLALISARRTAEANDVLSLLLATHLYCVLQAVDLRAMEFEFKKQFXPXXXXXLLXQHFGX
                                                                                                                                               VNDFYNNGLPSNLTASRNPSLDYGFKGAEIAMASYCSELQYLANPVTSHVQSAEQHNQDV
                                                                                                                                                                         LNAGMNRGLPSCL-AAEDPSLSYHCKGLDIAAAAYTSELGHLANPVTTHVQPAEMGNQAV
                                                                                                                                                                                                                                             TKŚTERETNŚVNONPLIDVSRNKATHĠĠNFQGTPTGVSMDNTRLATAATĠKLMFAQFSEL
                                                                                                                                                                                                                                                                       VLSLEAG-QSTTDNPLIDVENKXTHHGGNFQASAVXNTMEKTRLALIALIGKLNFTQLTEM
                                                                                                                                                                                                                                                                                                                                             AAIMEHILDGSSYMKLAQKLHEMDPLQKP-----KQDRYALRTSPQWLGPQIE--VIRYA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              ASGDLVPLSYIAGLLTGRPNSKA-TGPNG--EALTAEEAFKLAGISSGFFDLQPKEGLAL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         ----SHTLPHSATRAAMLVRINTLLQGFSGIRFEILEAITSFLNNNITPSLPLRGTIT
                                                 NSLGLISSRKTSEAVDILKLMSTTFLVAICQAVDLRHLEENLRQ---
                                                                                                                                                                                                                                                                                                                                                                                            ARNIRTLLEGSXF----AVHHEEEVKVKDDEGILRQDRYPLRTSPQWLGPLVSDMIHAHA
                                                                                                                                                                                                                                                                                                                                                                                                                                              VNGTAVGSGMASMVLFETNVLSVLAEILSAVFAEVMSGKP-EFTDHLTHRLKHHPGQIEA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          VNGTAVSASMATLALHDAHMLSLLSQALTALTVEAMVGHAGSFHPFLHDVTRPHPTQIEV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        ASGDLSPLSYIAAAITGHPDSKVHVXHEGXEKIMXAREAIALFGLEP--VVLGPKEGLGL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           XLGRGLENSLPLEVVRGAMTIRVNSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTIS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          GAAAEQMKGSHLDEVKRMVAE-FRKPVVNLGGETLTIGQVAAISTIGNSVKVELSETARA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    GSXLPTTXXTQLDIVEXXLADPXTDDXXELDGYSLTLGDVVGAARKGRXVRVXDSDEIRX
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     28.8%; Score 969; DB 10; Length; 35.5%; Pred. No. 8.8e-68; tive 120; Mismatches 257; Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                EMBL/GenBank/DDBJ databases
  XKXLXKRL--EQTNSYDLEPRWHDAFSXAT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CRC64;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Length 725;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        92;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Gaps
  612
                                                                                                                                                                                                                                               439
                                                                                                                                                                                                                                                                                            450
                                                                                                                                                                                                                                                                                                                                                379
                                                                                                                                                                                                                                                                                                                                                                                            391
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            335
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         157
                                                                                                                                            499
                                                                                                                                                                                                                                                                                                                                                                                                                                              326
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           267
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          275
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         210
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        217
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          97
```

```
RESULT
OBWELT
ID WAR
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC Q8
AC 
Ś
                                                    片
                                                                                           15
                                                                                                                                                      밁
                                                                                                                                                                                                   δ
                                                                                                                                                                                                                                                                B
                                                                                                                                                                                                                                                                                                       8
                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                 δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    당
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Matches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Query Match
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    lettuce leaf tissue.";
Submitted (AUG-2000) to the EMBL/GenBank/DDBJ (BUBL) (AP29930) AAL55242.1;
GO; GO:0005737; C:cytcplasm; IEA.
GO; GO:0016211; F:ammonia ligase activity; IEA.
GO; GO:0016211; F:ammonia-lyase activity; IEA.
GO; GO:0016841; F:ammonia-lyase activity; IEA.
GO; GO:0016829; F:lyase activity; IEA.
GO; GO:000529; P:biosynthesis; IEA.
GO; GO:0009058; P:biosynthesis; IEA.
GO; GO:0009058; P:phenylalanine catabolism; IE.
InterPro; IPR001106; Phe/His NH31yase.
InterPro; IPR001106; Phe/His NH31yase.
InterPro; IPR005102; Phe_am_Tyase.
Pfam; PF00221; PAL; 1.
ITIGRPAMS; TIGR01226; Phe_am_Tyase; 1.
PROSITE; PS00448; PAL—HISTIDASE; 1.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Lyase.
SEQUENCE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      01-MAR-2002 (TREMBLrel. 20, Created)
01-MAR-2002 (TREMBLrel. 20, Last sequence update)
01-OCT-2003 (TREMBLrel. 25, Last annotation update)
Phenylalanine ammonia-lyase.
Lactuca sativa (Garden lettuce).
Eukaryota; Viridiplantae; Streptophyta; Embryophyta; Tracheophyta;
Spermatophyta; Magnoliophyta; eudicotyledons; core eudicots; aster:
campanulids; Asterales; Asteraceae; Cichorioideae; Cichorieae;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Q8W2E4 ;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          SEQUENCE FROM N.A.
Campos-Vargas R., Nonogaki H., Suslow "Characterization of phenylalanine amm
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    NCBI_TaxID=4236;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  N
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Local
                                                                                                       223
                                                                                                                                                         142
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           596
     281
                                                                                                                                                                                                           165
                                                                                                                                                                                                                                                                                                                  107
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       653
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     719
                                                                                                                                                                                                                                                                91
                                                                                                                                                                                                                                                                                                                                                                       32
                                                                                                                                                                                                                                                                                                                                                                                                                   49 TQLDIVEXXLADPXTDDXXELDGYSLTLGDVVG--AARKGRXVRVXDSDEIRXKIDKSVE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Similarity
                                                                                         SPLSYIAAAITGHPDSKVHVXHEGXEKIMXAREAIALFGLEP--VVLGPKEGLGLVNGTA
                                                                                                                                                                                                                                                             WVMESYNKGTDSYGVTTGFGATSHRRTKQGGALQKELIRFLNAGI-----FGNGTE
                                                                                                                                                         TSHTLPHSATRAAMIVRINTLLQGYSGIRFEILEAITKFLNNNITPCLPLRGTITASGDL
                                                                                                                                                                                                NS--LPLEVVRGAMTIRVNSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDL
                                                                                                                                                                                                                                                                                                                                                                 SHLDEVKKMVAE-FRKPVVKLGGETLTVSQVAGIAAANDSDTVKVELSEAARAGVKASSD
     VSASMATLALHDAHMLSLLSQALTALTVEAMVGHAGSFHPFLHDVTRPHPTQIEVARNIR
                                                                                                                                                                                                                                                                                                                  FLRXQLXNSV--YGVTTGFGGSADTRTEDAISLQKALLEHQLCGVLPTSXDSFXLGRGLE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   DPMMECL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 GTSAIPNRIKECRSYPLYRFVREELGT---
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           YPLIQKLRQ---VIVDHALINGESEKNAVTSIFHKIGAFEEELKAVLPKEVEAARAAYDN
                                                    VPLSYIAGLLTGRPNSKA-VGPTG--EVLNAEKAFAAAGVEGGFFELQPKEGLALVNGTA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                GTVVEXLSSXXXXXVSLAAVNA---
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  ---TVKNTVSQVAKKVLTTGVNGELHPSRFCEKDLLKVVDREQVYTYADDP----
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     XVLVKML
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      SSSPALXYLSP-RTRVLYSFVREELGVKARRGDVFLGKQEVTIGSNVSRIYEAIKSGRIN 718
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  711
                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   PRELIMINARY;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  AA;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     714
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     725
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  77363 MW;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    28.7%; Score 967; DB 10; 36.9%; Pred. No. 1.2e-67;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                              108;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                EMBL/GenBank/DDBJ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  3120AB2877C29513 CRC64;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Mismatches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            low T., Saltveit ammonia-lyase ()
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             ---WKVAXAEKAIS--LTRXVRXXFWXAPS 659
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       -ELLTGEKVTSPGEEFDKVFTAICEGKII
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            ; IEA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                              262;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              IEA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   databases
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  it M.;
(PAL)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  gene
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                711;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                           80;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  ij
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    asterids;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     wounded
     340
                                                                                                                                                                                                                                                                                                                  164
                                                                                                                                                                                                                                                                                                                                                                                                                         106
                                                                                                                                                         201
                                                                                                                                                                                                           222
                                                                                                                                                                                                                                                                   141
                                                                                                                                                                                                                                                                                                                                                                    90
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          707
                                                       258
                                                                                                       280
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              652
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  595
                                                                                                                                                                                                                                                                                                                                                                                                                                                                           20
```

```
8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            ğ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Вb
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      밁
                                    5
                                                                                                  밁
                                                                                                                                            Ş
밁
                                                                                                                                                                                                                                                                                                         RA Han B., Feng Q., Huang Y.C., Li Y., Zhu J.J., Zhao Q., Hu X.,

RA Liu Y.L., Mu J., Yu Z., Chen L., Fan D.L., Weng Q.J., Zhang L.,

RA Lu Y.Q., Yu S.L., Liu X.H., Lu T.T., Zhang Y.J., Lu Y., Li C., Li T.,

A Zhang Y., Hu H., Jia F.X., Qian Y.M., Ying K., Zhou B., Chen Z.H.,

RA Hao P., Zhang L., Wu M., Zhang R.Q., Guan J.P., Fu G., Wang S.Y.,

RA Ren S.X., Lv-G., Lin W., Gu W.Q., Zhu G.F., Tu Y.F., Jia J., Yin H.F.,

A Zhang Y., Cai Z., Chen J., Kang H., Chen X.Y., Shao C.Y., Sun Y.,

RA Hu Q.P., Zhang X.L., Zhang W., Wang L.J., Ding C.W., Sheng H.H.,

A Gu J.L., Chen S.T., Ni L., Zhu F.H., Hong G.F.,

Submitted (VAY-2002) to the EMBL/GenBank/DDBJ databases.

RMBL, AL73163; CAE05619.1; --

REMBL, AL731616; CAE05619.1; --

REMBL, AL731616; CAE05619.1; --

REMBL, AL731616; CAE05619.1; --

REMBL, AL731616; CAE05619.1; --

REMBL, AL731616; CAE05619.1; --

REMBL, AL731616; CAE05619.1; --

REMBL, AL731616; CAE05619.1; --

REMBL, AL731616; CAE05619.1; --

REMBL, AL731616; CAE05619.1; --

REMBL, AL731616; CAE05619.1; --

REMBL, AL731616; CAE05619.1; --

REMBL, AL731616; CAE05619.1; --

REMBL, AL731616; CAE05619.1; --

REMBL, AL731616; CAE05619.1; --

REMBL, AL731616; CAE05619.1; --

REMBL, AL731616; CAE05619.1; --

REMBL, AL731616; CAE05619.1; --

REMBL, AL731616; CAE05619.1; --

REMBL, AL731616; CAE05619.1; --

REMBL, AL731616; CAE05619.1; --

REMBL, AL731619.1;                                                                                                                                                                                                             Query Match
Best Local S
Matches 257
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Q7X7G3 PRELIMINARY; PRT; 707 AA. Q7X7G3; 01-OCT-2003 (TrEMBLrel. 25, Created) 01-OCT-2003 (TrEMBLrel. 25, Last sequence update) 01-OCT-2003 (TrEMBLrel. 25, Last annotation update) 05JNBa0073E02.12 protein (OSJNBA0061C13.1 protein). OSJNBA0073E02.12 ON OSJNBB0061C13.1.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Eukaryota; Viridiplantae; Streptophyta; Embryophyta; Tracheophyta; Spermatophyta; Magnoliophyta; Liliopsida; Poales; Poaceae; Ehrhartoideae; Oryzeae; Oryza.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Oryza sativa (Rice).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            NCBI_TaxID=4530;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       654
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       674
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               614
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 556
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    575
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         496
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            520
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 436
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 461
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      376
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           401
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 318
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      259
                                                  107
                                                                                                                                                                                                               257;
                                                                                                                                                       49
                                                                                                                                                                                                                                      Similarity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  TLLEGSXFAVHHEEEVKVKDDEGILRQDRYPLRTSPQWLGPLVSDMIHAHAVLSLEAGQS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                VGSGMASMVLFDANVLALLSEVLSAIFAEVMQGKP-EFTDHLTHKLKHHPGQIEAAAIME
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                VLYSFVREELGVKARRGDVFLGKQEVTI-GSNVSRIYEAIKSGRINXVLVKML
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   TAEAVDILXLMSSTYLVALCQSIDLRHLEENMKSTVKNTVSQVAKKVLTMGVNGELHPSR
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           SNISGGRNPSIDYGFKGGEIAMASYCSELQFLANEVTNHVQSAEQHNQDVNSIGIISARK
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             SCLA-AEDPSLSYHCKGLDIAAAAYTSELGHLANPYTTHVQPAEMGNQAVNSLALISARR
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          TTDNPLIDVENKXTHHGGNFQASAVXNTMEKTRLALALIGKLNFTQLTEMLNAGMNRGLP
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 YILDGSDY-VKAAQKVHEMDPLQKPKQDRYALRTSPQWLGPQI-EVIRSSTKMIEREINS
  WILNCIAHGGDIYGVTTGFGGTSHRRTKDGQALQVELLRHLNAGIFGNGSDG------
                                       FLRXQLXN--SVYGVTTGFGGSADTRTEDAISLQKALLEHQLCGVLPTSXDSFXLGRGLE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    PLYRFVREELG----RG--FLIGEKVISPGEEFDRVFTAMCKGQIIDPLLECL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            TFEEELK-----VLLPKEVEGVRIAYENDTLSIPNRIK---
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            TVVEXLSSXXXXXVSLAAVNAWKVAXAEKAISLTRXVRXXFWXAPSSSSPALXYLSPRTR 673
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    FCEKDLLRVVDREYVFAYIDDVCSGTYPLMQKLRQVLVDHALNNGETEKNTNTSIFQKIA 615
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    XXXXELXXXVXXX-------LXKRLEQT-----NSYDLEPRWHDAFSXATG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            TAEANDVLSLLLATHLYCVLQAVDLRAMEFEFKKQFXPXXXXLLXQHF-----GXXXTXX
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      VNDNPLIDVSRNKALHGGNFQGTPIGVSMDNTRLAIAAIGKLMFAQFSELVNDFYNNGLP
                                                                                                     SHLDEVKRMVAQ-SREAVVKIEGSSLRVGQVAAVSAAKDASGVVVELDEEARPRVKASSE
                                                                                                                                                       TQLDIVEXXLADPXTDDXXELDGYSLTLGDV--VGAARKGRXVRVXDSDEIRXKIDKSVE
                                                                                                                                                                                                            28.7%; Score 965.5; DB 10 37.1%; Pred. No. 1.6e-67; tive 122; Mismatches 273;
                                                                                                                                                                                                                                                               DB 10; Length
                                                                                                                                                                                                               Indels
                                                                                                                                                                                                                                                                       707;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    -----ACRSY
                                                                                                                                                                                                               41;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            725
                                                                                                                                                                                                                  Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 495
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           460
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      519
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      400
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         317
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            555
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            435
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   375
                                                        164
                                                                                                             87
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               653
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       613
```

```
N [1]

(P SEQUENCE FROM N.A.

(P SEQUENCE FROM N.A.

(C STRAIN=cv. Nipponbare;

RA Cooper B., Hutchison D., Park S., Guimil S., Luginbuhl P.,

RA Cooper B., Hutchison D., Park S., Guimil S., Luginbuhl P.,

RA Cooper B., Hutchison D., Park S., Guimil S., Luginbuhl P.,

RA Cooper B., Hutchison D., Park S., Guimil S., Luginbuhl P.,

RA Cooper B., Hutchison D., Park S., Guimil S., Luginbuhl P.,

RA Cooper B., Hutchison D., Park S., Guimil S., Luginbuhl P.,

RA Cooper B., Hutchison D., Park S., Guimil S., Luginbuhl P.,

RA Cooper B., Hutchison D., Park S., Guimil S., Luginbuhl P.,

RA Cooper B., Hutchison D., Park S., Guimil S., Luginbuhl P.,

RA Cooper B., Hutchison D., Park S., Guimil S., Luginbuhl P.,

RA Cooper B., Hutchison D., Park S., Guimil S., Luginbuhl P.,

RA Cooper B., Hutchison D., Park S., Guimil S., Luginbuhl P.,

RA Cooper B., Hutchison D., Park S., Guimil S., Luginbuhl P.,

RA Cooper B., Hutchison D., Park S., Guimil S., Luginbuhl P.,

RA Cooper B., Hutchison D., Park S., Guimil S., Luginbuhl P.,

RA Cooper B., Hutchison D., Park S., Guimil S., Luginbuhl P.,

RA Cooper B., Hutchison D., Park S., Guimil S., Luginbuhl P.,

RA Cooper B., Hutchison D., Park S., Guimil S., Luginbuhl P.,

RA Cooper B., Hutchison D., Park S., Guimil S., Luginbuhl P.,

RA Cooper B., Hutchison D., Park S., Guimil S., Luginbuhl P.,

RA Cooper B., Hutchison D., Park S., Guimil S., Luginbuhl P.,

RA Cooper B., Hutchison D., Park S., Guimil S., Luginbuhl P.,

RA Cooper B., Hutchison D., Park S., Guimil S., Luginbuhl P.,

RA Cooper B., Hutchison D., Park S., Guimil S., Luginbuhl P.,

RA Cooper B., Hutchison D., Park S., Guimil S., Luginbuhl P.,

RA Cooper B., Hutchison D., Park S., Guimil S., Luginbuhl P.,

RA Cooper B., Hutchison D., Park S., Guimil S., Luginbuhl P.,

RA Cooper B., Hutchison D., Park S., Guimil S., Luginbuhl P.,

RA Cooper B., Hutchison D., Park S., Guimil S., Luginbuhl P.,

RA Cooper B., Hutchison D., Park S., Guimil S., Luginbuhl P.,

RA Cooper B., Hutchison D., Park S., Guimil S., Luginbuhl P.,

RA Cooper B.,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  γQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ś
                                           Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Q84VE0;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                        01-JUN-2003 (TrEMBLrel. 24, Created)
01-JUN-2003 (TrEMBLrel. 24, Last sequence update)
01-JUN-2003 (TrEMBLrel. 25, Last annotation update)
01-OCT-2003 (TrEMBLrel. 25, Last annotation update)
Phenylalanine ammonia-lyase.
Oryza sativa (japonica cultivar-group).
Eukaryota; Viridiplantae; Streptophyta; Embryophyta; Tracheophyta;
Spermatophyta; Magnoliophyta; Liliopsida; Poales; Poaceae;
Ehrhartoideae; Oryzeae; Oryza.
NCBI TaxID=39947;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                371
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 400
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               316
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           343
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           140
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      491
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   431
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 460
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            257
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             283
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         165
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        610
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      637
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       551
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  519
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           664 LTGEKLKSPGEECNKVFLAISERKLIDPMLECL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        NSLPLEVVRGAMTIRVNSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSP
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  RTAEANDVLSILLATHLYCVLQAVDLRAMEFEFKKQFXPXXXXLLXQHFGXXXXXXXXX
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             LEGSXFAVHHEEEVKVKDDEGIL--RODRYPLRTSPOWLGPLVSDMIHAHAVLSLEAG-O
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          ASMATLALHDAHMLSLLSQALTALTVEAMVGHAGSFHPFLHDVTRPHPTQIEVARNIRTL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              LSYTAGLITGRPNAQA-VTVDG--KKVDAAEAFKIAGIQGGFFRLEPKEGLAIVNGTSVG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        ITAFEEELREALPREMEAARVAFETGTAPITNRIKESRSFPLYRFVREELGC----
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    RFSEKALLTAIDR-EAVYSYADDPCSANYPLMTKIRAVLVEHALANGPAEKDDGSSVFSK
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      TSNLAGSRNPSLDYGFKGTEIAMASYCSELQFLANPVTNHVQSAEQHNQDVNSLGLVSAR
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          PSCLA-AEDPSLSYHCKGLDIAAAAYTSELGHLANPVTTHVQPAEMGNQAVNSLALISAR
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         STTDNPLIDVENKXTHHGGNFQASAVXNTMEKTRLALALIGKLNFTQLTEMLNAGMNRGL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     SALAAMVLYDANVLAVLSEVLSAVFCEVMNGKPEYTDHLTHKL-KHHPGSIEAAAIMEHI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          LSYIAAAITGHPDSKVHVXHEGXEKIMXAREAIALFGLEP--VVLGPKEGLGLVNGTAVS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    L-GKOEVTIGSNVSRIYEAIKSGRINXVLVKML 725
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     ELXXKVXKXLXKRLEQTNSYDLEP--RWHDAFSXATGTVVEXLSSXXXXXVSLAAVNAWK
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    KTAEAVDILKIMSSTYLVALCQAVDLRHLEENIKSAVKNCVTTVAKKVLTTGPAGGIHSA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   VAXAEKAI--SLIRXVRXXFWXAPSSSSPALXYL-SPRIRVLYSFVREELGVKARRGDVF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ΑA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             696
                                                                                                                                                                                                                                                                                                                                                                                          ۳.,
                                                                                                                                                                                                                                                                                                                                               ç
                                                                                                                                                                                                                                                                                                                                                                                          Ellero C.,
                                                                                                                                                                                                                                                                                                                                            Cyclin-
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Ϋ́
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         . 550
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       578
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       518
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     430
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    370
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    315
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 282
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  199
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           693
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            609
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          636
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           490
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      459
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   399
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  342
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                256
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               663
```

```
RESULT QUVXG7
ID Q8VXG7

PRELIMINARY;

AC Q8VXG7;

AC Q8VXG7;

DT 01-MAR-2002 (TrEMBLrel. 20, Created)

DT 01-MAR-2002 (TrEMBLrel. 20, Last sequence update)

DT 01-CCT-2003 (TrEMBLrel. 25, Last annotation update)

DT 01-CCT-2013 (TrEMBLrel. 25, Last annotation update)

DE Phenylalanine ammonia-lyase (EC 4.3.1.5).

S Zea mays (Maize).

C Eukaryota; Viridiplantae; Streptophyta; Embryophyta; Tracheop.

C Epacyota; Magnoliophyta; Liliopsida; Poales; Poaceae;

C PACCAD clade; Panicoideae; Andropogoneae; Zea.

X NCBI TaxID=4577;

V [1]
                                                                                                                                                                                                                           유 상 유 상
                                                                                                                                                                                         В
                                                                                                                                                                                                      Ş
                                                                                                                                                                                                                                                                                                                             В
                                                                                                                                                                                                                                                                                                                                             δ
                                                                                                                                                                                                                                                                                                                                                                    B
                                                                                                                                                                                                                                                                                                                                                                                            중 유
                                                                                                                                                                                                                                                                                                                                                                                                                                        Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                     멍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           g
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    SARRR
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Query Match 28.6
Best Local Similarity 37.5
Matches 253; Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Lyase.
SEQUENCE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Pfam; PF00221; PAL; 1.
TIGRFAMs; TIGR01226; phe am lyase;
PROSITE; PS00488; PAL_HISTIDASE; 1.
                                                                                                                                                                                                              712
                                                                                                                                                                                                                                     593
                                                                                                                                                                                                                                                           654
                                                                                                                                                                                                                                                                                  533
                                                                                                                                                                                                                                                                                                        598
                                                                                                                                                                                                                                                                                                                               474
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  240
                                                                                                                                                                                                                                                                                                                                                    538
                                                                                                                                                                                                                                                                                                                                                                            414
                                                                                                                                                                                                                                                                                                                                                                                                 478
                                                                                                                                                                                                                                                                                                                                                                                                                        354
                                                                                                                                                                                                                                                                                                                                                                                                                                                419
                                                                                                                                                                                                                                                                                                                                                                                                                                                                      296
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             362
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          302
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 182
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        244
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               123
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     184
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  124
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           71
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         11
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               89
                                                                                                                                                                                       ISERKLIDPMLECL
                                                                                                                                                                                                            IKSGRINXVLVKML
                                                                                                                                                                                                                                    RVAFETGTAPITNRIKESRSFPLYRFVREELGC-
                                                                                                                                                                                                                                                                                                   YDLEP--RWHDAFSXATGTVVEXLSSXXXXXVSLAAVNAWKVAXAEKAI--SLTRXVRXX
                                                                                                                                                                                                                                                                                                                             LCQAVDLRHLEENLKSAVKNCVTTVAKKVLTTGPAGGLHSARFSEKALLTAIDR-EAVYS
                                                                                                                                                                                                                                                                                                                                                                         ETAMASYCSELOFLANPVTNHVQSAEQHNQDVNSLGLVSARKTAEAVDILKLMSSTYLVA
                                                                                                                                                                                                                                                                                                                                                                                    DIAAAAYTSELGHLANPVTTHVQPAEMGNQAVNSLALISARRTAEANDVLSLLLATHLYC
                                                                                                                                                                                                                                                                                                                                                                                                                                   NFQASAVXNTMEKTRLALIGKLNFTQLTEMLNAGNNRGLPSCLA-AEDPSLSYHCKGL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                   DELKPKQDRYALTISPQWLGPQI-EVIRA-ATKSIEREVNSVNDNPVIDVHRGKALHGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  EGIL--RQDRYPLRTSPQWLGPLVSDMIHAHAVLSLEAG-QSTTDNPLIDVENKXTHHGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 VISAVFCEVMNGKPEYTDHLTHKL-KHHPGSIEAAAIMEHILAGSAFMPHAQ---KVNEV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    ALTALTVEAMVGHAGSFHPFLHDVTRPHPTQIEVARNIRTLLEGSXFAVHHEEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               VDG--KKVDAAEAFKIAGIQGGFFRLEPKEGLAIVNGTSVGSALAAMVLYDANVLAVLSE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         HEGXEKIMXAREAIALFGLEP--VVLGPKEGLGLVNGTAVSASNATLALHDAHMLSLLSQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           LQGYSGIRFEILEAITKLINTGVSPCLPLRGTITASGDLVPLSYIAGLITGRPNAQA-VT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          TRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAITGHPDSKVHVX
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GGSADTRTEDAISLQKALLEHQLCGVLPTSXDSFXLGRGLENSLPLEVVRGAMTIRVNSL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       KIEGSSLRVGQVAAVSAAKDASGVVVELDEEARPRVKASSEWILNCIAHGGDIYGVTTGF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  ELDGYSLTLGDV---VGAARKGRXVRVXDSDEIRXKIDKSVEFLRXQLXN---SVYGVTTGF
                                                                                                                                                                                                                                                         FWXAPSSSSPALXYL-SPRIRVLYSFVREELGVKARRGDVFL-GKQEVTIGSNVSRIYEA
                                                                                                                                                                                                                                                                                YADDPCSANYPLMTKIRAVL VEHALANGPAEKDDGSSVFSKITAFEEELREALPREMEAA
                                                                                                                                                                                                                                                                                                                                                   VLQAVDLRAMEFEFKKQFXPXXXXLLXQHFGXXXTXXXXXXELXXKVXKXLXKRLEQTNS
                                                                                                                                                                                                                                                                                                                                                                                                                       NFQGTPIGVSMDNTRLAIANIGKLMFAQFSELVNEFYNNGLTSNLAGSRNPSLDYGFKGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           GGTSHRRTKDGQALQVELLRHLNAGIFGNGSDG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   671 AA;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   72277 MW;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   28.6%; Score 963; DB 10; 37.5%; Pred. No. 2.4e-67; tive 118; Mismatches 263;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  23F93B995CE21E60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         -----NSLPSEVSRAAMLVRINTL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  CRC64;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Length
                                             Tracheophyta;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           671;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    40;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       418
                                                                                                                                                                                                                                    646
                                                                                                                                                                                                                                                         711
                                                                                                                                                                                                                                                                               592
                                                                                                                                                                                                                                                                                                                             532
                                                                                                                                                                                                                                                                                                                                                  597
                                                                                                                                                                                                                                                                                                                                                                                                537
                                                                                                                                                                                                                                                                                                                                                                                                                                              477
                                                                                                                                                                                                                                                                                                                                                                                                                                                                   353
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  295
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         122
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    243
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                183
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       70
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              123
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   19
            Ş
                                 밁
                                                  5
                                                                               В
                                                                                                Ó
                                                                                                                       В
                                                                                                                                              Ş
                                                                                                                                                                         밁
                                                                                                                                                                                          Ą
                                                                                                                                                                                                                    B
                                                                                                                                                                                                                                      δ
                                                                                                                                                                                                                                                                                     Ş
                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                 Ş
                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                 Ş
                                                                                                                                                                                                                                                                                                                                                                                                                              δ
                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                        В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                        8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         δ
```

```
T activity.";

I. Plant Physiol. 113:175-179(1997).

R EMBL, L77912; AAL40137.1; -.

R GO; GO:005737; C:cytoplasm; IEA.

R GO; GO:00165211; F:ammonia ligase activity; IEA.

R GO; GO:0016521; F:ammonia ligase activity; IEA.

R GO; GO:0016529; F:phenylalanine ammonia-lyase activity; IEA.

R GO; GO:0045548; F:phenylalanine ammonia-lyase activity; IEA.

R GO; GO:0045559; P:phenylalanine catabolism; IEA.

R GO; GO:0006559; P:phenylalanine catabolism; IEA.

DR InterPro; IPR00106; Phe-Mis NH31yase.

DR InterPro; IPR005922; Phe_am_lyase.

DR Pfam; PF00221; PAL; 1.

DR PROSITE; PS00488; PAL_HISTIDASE; 1.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Query Match
Best Local Similarity
Matches 255; Conserv
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       SEQUENCE FROM N.A.
STRAIN=CV. Corso;
MEDLINE=97161122;
Rosler J., Krekel F., i
"Maize phenylalanine ar
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  SEQUENCE
 664
                            560
                                                                                    521
                                                                                                              570
                                                                                                                                         478
                                                                                                                                                                                                  418
                                                                                                                                                                                                                            451
                                                                                                                                                                                                                                                          358
                                                                                                                                                                                                                                                                                   392
                                                                                                                                                                                                                                                                                                              303
                                                                                                                                                                                                                                                                                                                                          334
                                                                                                                                                                                                                                                                                                                                                                      244
                                                                                                                                                                                                                                                                                                                                                                                                 274
                                                                                                                                                                                                                                                                                                                                                                                                                            187
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    135
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               156
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      98
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  16
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               40
                                                                                                                                                         NSLALISARRTAEANDVLSLLLATHLYCVLQAVDLRAMEFEFKKQFXPXXXXLLXQHFGX
                                                                                                                                                                                                                                                     AAVNAWKVAXAEKAISLTRXVRXXF--
                                                                                                                                         NSLGLVSARKTAEAIDILKLMSSTYIVALCQAVDLRHLEENIK-
                                                                                                                                                                                               VNEFYNNGLTSNLAGSRNPSLDYGFKGTEIAMASYCSELQXLGNPITNHYQSADEHNQDV
                                                                                                                                                                                                               LNAGMNRGLPSCLA-AEDPSLSYHCKGLDIAAAAYTSELGHLANPVTTHVQPAEMGNQAV
                                                                                                                                                                                                                                                                                                                                                                                                                           ISASGDLSPLSYIAAAITGHPDSKVHVXHEGXEKIMXAREAIALFGLEP--VVLGPKEGL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       <u>EÄVFTYAEDAÄSASLPLMOKLRAVLVDHALSSGERGAGALRVLQDHOVRGGÄPRGAAPGG</u>
                                                                                                            XXTXXXXXXELXXKVXKXLXKRLEQTNSYDLEPRWHDAFSXATGTVVEXLSSXXXXXVSL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   G-----HTLPSEVTRAAMLVRINTLLQGYSGIRFEILEAITKLLNTGVSPCLPLRGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     SFXLGRGLENSLPLEVVRGAMTIRVNSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               GSXLPTTXXTQLDIVEXXLADPXTDDXXELDGYSLTLGDV--VGAARKGRXVRVXDSDEI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  703
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  AA;
                                                                                  ASVKNTVTQVAKKVLTMNPSGEL---
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  74926 MW; 11374FD68516971E CRC64;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      28.5%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           ammonia-lyase
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Amrhein N.,
-ALXYLSPRTRVLYSFVREELGVKARRGDVFL-GKQEVTIGSNVSRI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        127;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Score 958.5; DB 10;
Pred. No. 5.7e-67;
27; Mismatches 242;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Schmid J.;
e has tyrosine
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      ; DB 10;
.7e-67;
                                                                                  -SSARFSEKELISA----IDR
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           ammonia-lyase
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Length
                                                       -WXAPSSSSP--
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        113;
 708
                            619
                                                      663
                                                                                  559
                                                                                                               629
                                                                                                                                         520
                                                                                                                                                                     569
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      155
                                                                                                                                                                                                  477
                                                                                                                                                                                                                            505
                                                                                                                                                                                                                                                        417
                                                                                                                                                                                                                                                                                  450
                                                                                                                                                                                                                                                                                                             357
                                                                                                                                                                                                                                                                                                                                          391
                                                                                                                                                                                                                                                                                                                                                                     302
                                                                                                                                                                                                                                                                                                                                                                                                333
                                                                                                                                                                                                                                                                                                                                                                                                                            243
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   186
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          134
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  74
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               97
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        21
```

```
RESULT 6
Q9AXIS
ID Q9AXIS
DT 011100
DT 011110
DT 0111110
T 011110
DT 01110
DT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ď,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                           S
                                                                                                                                                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      B,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         8
                               Ş
                                                                                            밁
                                                                                                                                            8
                                                                                                                                                                                                                                                                        S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Query Match
Best Local Sim
Matches 259;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        R GO; GO:0005737; C:cytoplasm; IEA.
R GO; GO:0016211; F:ammonia ligase activity; IEA.
R GO; GO:0016829; F:lyase activity; IEA.
R GO; GO:0045548; F:phenylalanine ammonia-lyase activity; IEA.
R GO; GO:0009058; P:bhenylalanine catabolism; IEA.
R GO; GO:0006559; P:phenylalanine catabolism; IEA.
R InterPro; IPR008948; L-Aspartase-like.
R InterPro; IPR001106; Phe/His NH31yase.
R InterPro; IPR005106; Phe/His NH31yase.
R Ffam; PF00221; PAL; J.
R Pfam; PF00221; PAL; J.
R TIGRPAMS; TIGR01226; Phe_am_lyase; 1.
R PGSTIE; PS00488; PAL_HISTIDASE; 1.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Q9AXI5;
01-JUN-2001
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Lyase.
SEQUENCE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        01-JUN-2001 (TrEMBLrel. 17, Created)
01-JUN-2001 (TrEMBLrel. 17, Last sequence update)
01-JUN-2003 (TrEMBLrel. 17, Last sequence update)
01-OCT-2003 (TrEMBLrel. 12, Last annotation update)
Phenylalanine ammonia-lyase (EC 4.3.1.5).
Pharbitis nil (Violet) (Japanese morning glory).
Eukaryota; Viridiplantae; Streptophyta; Embryophyta; Tracheophyta;
Spermatophyta; Magnoliophyta; eudicotyledons; core eudicots; asterids;
Spermatophyta; Magnoliophyta; eudicotyledons; core eudicots; asterids;
Iamiids; Solanles; Convolvulaceae; Ipomoea.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Nakazawa A., Nozue M., Yasuda H., Takeba G., Kubo H.;
"Expression of phenylalanine ammonia-lyase in Pharbitis nil.";
Submitted (DEC-2000) to the EMBL/GenBank/DDBJ databases.
EMBL; AF325496; AAG49585.1; -.
HSSP; P21310; 188F.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            STRAIN=cv. Violet;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         SEQUENCE FROM N.A.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               NCBI_TaxID=35883;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Q9AXI5
                               403
                                                                                            320
                                                                                                                                                  343
                                                                                                                                                                                                                                                                           283
                                                                                                                                                                                                                                                                                                                                        204
                                                                                                                                                                                                                                                                                                                                                                                                                                                             144
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       165
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             109
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          674
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   709
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               620
                                                                                                                                                                                                                  261
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               49
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                93
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      ω
A
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Similarity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             NSLPLEVVRGAMTIRVNSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSP
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      SHLDEVKYMVAE-FRKPAVKLGGETLTVAQVAAIASRDNAVTVELSEESRAGVKASSDWV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               TQLDIVEXXLADEXTDDXXELDGYSLTLGDVVGAARKGRXVRVXDSDEIRXKIDKSVEFL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          FVGISQGKLVDPMLECL
DNPLIDVENKXTHHGGNFQASAVXNTMEKTRLALALIGKLNFTQLTEMLNAGMNRGLPSC
                                                                                                                                                  LEGSXFAVHHEEEVKVKDDEGILRODRYPLRTSPOWLGPLVSDMIHAHAVLSLEAGOSTT
                                                                                                                                                                                                                     SGMASMVLFEANVLAVLSEVLSAIFAEVMNGKP-EFTDHLTHKLKHHPGQIEAAAIMEHI
                                                                                                                                                                                                                                                                           ASMATLALHDAHMLSLLSQALTALTVEAMVGHAGSFHPFLHDVTRPHPTQIEVARNIRTL
                                                                                                                                                                                                                                                                                                                                        LSYIAGLITGRPNSKA-VGPNG--ETLNAEEALRLAGVNGGFFELQPKEGLALVNGTAVG
                                                                                                                                                                                                                                                                                                                                                                                              LSYIAAAITGHPDSKVHVXHEGXEKIMXAREAIALFGLEP--VVLGPKEGLGLVNGTAVS
                                                                                                                                                                                                                                                                                                                                                                                                                                                          HTLPHSATRAAMLVRINTLLQGYSGIRFEILEAITKLLNHNITPCLPLRGTITASGDLVP
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   MDSMNKGTDSYGVTTGFGATSHRRTKQGGALQKELIRFLNAGI-----FGNGTESC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      RXQLXNSV--YGVTTGFGGSADTRTEDAISLQKALLEHQLCGVLFTSXDSFXLGRGLE--
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   YEAIKSGRINXVLVKML
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            GGRPRGVAEGTAPVANRIADSRSFPLYRFVREELGC-----VFLTGERLKSPGEECNKV
                                                                                            LDGSSY-VKAAQKMHEMDPLQKPKQDRYALRTSPQWLGPQI-EVIRAATKMIEREINSVN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  711 AA;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     28.4%; Score 955; DB 10; ilarity 36.3%; Pred. No. 1.1e-66; Conservative 103; Mismatches 268;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          PRELIMINARY;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  77085 MW; CBE6E3A0C0969E90 CRC64;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             690
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   725
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             PRT;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             711
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             A
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     711;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            84;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               673
                                      462
                                                                                               377
                                                                                                                                                            402
                                                                                                                                                                                                                  319
                                                                                                                                                                                                                                                                           342
                                                                                                                                                                                                                                                                                                                                        260
                                                                                                                                                                                                                                                                                                                                                                                                    282
                                                                                                                                                                                                                                                                                                                                                                                                                                                             203
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          224
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   143
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             164
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         92
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      108
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            18
```

```
Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ϋ́
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           B
 밁
                          Ş
                                                        밁
                                                                                δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   맑
                                                                                                                 Query Match
Best Local S
Matches 257
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Q9MS67;
01-OCT-2000 (TrEMBLrel. 15, Created)
01-OCT-2000 (TrEMBLrel. 15, Last sequence update)
01-OCT-2003 (TrEMBLrel. 25, Last annotation updat
Phenylalanine ammonia-lyase 2 (EC 4.3.1.5).
                                                                                                                                                                         Lyase.
SEQUENCE
                                                                                                                                                                                                                                GO; GO:0005737; C:cytoplasm; IEA.
GO; GO:0005737; C:cytoplasm; IEA.
GO; GO:001621; F:ammonia ligase activity; IEA.
GO; GO:0016829; F:lyase activity; IEA.
GO; GO:0045548; F:phenylalanine ammonia-lyase activity;
GO; GO:000555; P:bhenylalanine catabolism; IEA.
GO; GO:0006559; P:phenylalanine catabolism; IEA.
InterPro; IPR008948; L-Aspartase-like.
InterPro; IPR001106; Phe/H:s_NH3Jyase.
InterPro; IPR001106; Phe/H:s_NH3Jyase.
InterPro; IPR001106; Phe/H:s_NH3Jyase.
InterPro; IPR001106; Phe/H:s_NH3Jyase.
IPR001221; PAL; 1.
                                                                                                                                                                                                                                                                                                                                                                              "The phenylalanine ammonia-lyase gene expression, and evolution."; plant Physiol. 127:230-239(2001). EMBL; AF237955; AAF40224.1; -... HSSP; P21310; 188F.
                                                                                                                                                                                                      TIGRFAMs; TIGR01226; phe_am_lyase; PROSITE; PS00488; PAL_HISTIDASE; 1
                                                                                                                                                                                                                                                                                                                                                                                                                                                     SEQUENCE FROM N.A.
MEDLINE=21437948; PubMed=11553751;
Kumar A., Ellis B.E.;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         eurosids I; Rosales; Rosaceae; Rosoideae; Rubus.
NCBI TaxID=32247;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Rubus idaeus (Raspberry).
Eukaryota; Viridiplantae;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Q9M567
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      7
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    652
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            608
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      614
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   558
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             567
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           498
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        522
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   438
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              463
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            378
                                                                                                                   257;
                                                          44
                                                                                       40
                                                                                                                                 Similarity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         BAVDVLKLMSSTYLVALCQAIDLRFLEENLRNAVKNAVTQVAKRTLTMGANGELHPARFC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            L-AAEDPSLSYHCKGLDIAAAAYTSELGHLANPVTTHVQPAEMGNQAVNSLALISARRTA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 SYPLYKFVREGIGT----ELLTGEKVRSPGEECDKVFTAMCEGSIIDPLLECL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              TRVLYSFVREELGVKARRGDVFLGKQEVTIGSNVSRIYEAIKSGRINXVLVKML
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      TVVEXLSSXXXXXVSLAAVNAWKVAXAEKAISLTRXVRXXFWXAPSSSSPAL--XYLSPR
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      EANDVISILLATHIYCVLQAVDIRAMEFEFKKQFXPXXXXLLXQ-------H----
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   LTAGRNPSLDYGFKGAEIAMASYCSELQFLANPVINHVQSAEQHNQDVNSLGLISARKTA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           DNPLIDVARSKALHGGNFQGTPIGVSMDNSRLALASIGKLLFAQFSELVNDYYNNGLPSN
EKDLLRVVDREYVFAYADDPCSANYPLMQKLRQALVDHALQNGESEKN-----TG
                             KIDKSVEFLRXQLXNSV--YGVTTGFGGSADTRTEDAISLQKALLEHQLCGVLFTSXDSF 157
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         TSI-----FLKVÄÄFEDELKAVLPKEVEAAR-----IÄVESGNPÄIPNRIKECR
                                                          GSXLPTTXXTQLDIVEXXLADPXTDDXXELDGYSLTLGDVVGAARKGRXVRVXDSDEIRX 99
                                                                                                                                                                            730 AA;
                                                                                                                 28.4%; Score 955; DB ilarity 36.8%; Pred. No. 1.1e Conservative 107; Mismatches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          PRELIMINARY;
                                                                                                                                                                            79422 MW; 0E942417E50CE113 CRC64;
                                                                                                                               28.4%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                FGXXXTXXXXXXELXXKVXXXXLXXRLEQTNSYDLEPRWHDAFSXATG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Streptophyta; Embryophyta; Tracheophyta; yta; eudicotyledons; core eudicots; rosids;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          PRT;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            730
                                                                                                                                                                                                                                                                                                                                                                                                                                          family in raspberry.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       tion update)
                                                                                                                                 DB 10;
1.1e-66;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            A
                                                                                                                    283;
                                                                                                                                             Length
                                                                                                                    Indels
                                                                                                                                                730;
                                                                                                                                                                                                                                                                                                                             IEA
                                                                                                                    52;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    700
                                                                                                                    Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       497
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 521
                                                             102
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                613
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              557
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           566
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              437
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               159
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         671
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      607
```

```
RESULT
OPACION
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
ACCOMENTA
A
    Rhemannia glutinosa.";

Submitted (JUL-2001) to the EMBL/GenBank/DDBJ databases.

EMBL; AF401636; AAK84225 1;

GO; GO:0005737; C:cytoplasm; IEA.

GO; GO:0016211; F:ammonia ligase activity; IEA.

GO; GO:0016821; F:lyase activity; IEA.

GO; GO:0016821; F:lyase activity; IEA.

GO; GO:0016821; F:bhenylalanine ammonia-lyase activity; IEA.

GO; GO:0006559; F:lyase activity; IEA.

GO; GO:0006559; P:bhenylalanine catabolism; IEA.

GO; GO:0006559; P:bhenylalanine catabolism; IEA.

R InterPro; IPR008948; L-Aspartase-like.

InterPro; IPR0015922; Phe am lyase.

R InterPro; IPR0055922; Phe am lyase.

InterPro; IPR005162; Ppantne_S.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Q94EN0 PRELIMINARY;
Q94EN0;
O1-DEC-2001 (TrEMBLrel. 19, C
O1-DEC-2001 (TrEMBLrel. 19, L
O1-OCT-2003 (TrEMBLrel. 25, L
Phenylalanine ammonia-lyase (
                                                                                                                                                                                                                                                                                                         SEQUENCE FROM N.A. STRAIN=cv. Keumsan; Yun S.J., Lee B.K.,
                                                                                                                                                                                                                                                                                                                                                                                         Rehmannia glutinosa.
Bukaryota; Viridiplantaa; Streptophyta; Embryophyta; Tracheophyta;
Spermatophyta; Magnoliophyta; eudicotyledons; core eudicots; asterids;
lamiids; Lamiales; Lamiales incertae sedis; Rehmannia.
NCBI_TaxID=99300;
                                                                                                                                                                                                                                                                                       Yun S.J., Lee B.K., Park M.R., "Molecular characterization of
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           ω
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       449
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                678
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      679
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 619
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          634
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   569
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            574
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       509
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           514
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  455
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               389
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          396
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   332
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          336
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     273
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              276
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         216
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           162
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 158
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   LISSRKTABAVDILKIMSSTFLVALCQAIDLRHLEENLKSTVKNTVSQLAKRVLTTGVNG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                MNRGLPSCLA-AEDPSLSYHCKGLDIAAAAYTSELGHLANPVTTHVQPAEMGNQAVNSLA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        EAG-QSTTDNPLIDVENKXTHHGGNFQASAVXNTMEKTRLALALIGKLNFTQLTEMLNAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              VNGTAVSASMATLALHDAHMLSLLSQALTALTVEAMVGHAGSFHPFLHDVTRÞHÞTQIEV
||||||:::|:||:||:||:||:|||
VNGTAVGSGLASTVLFETNILALLSEILGAIFAEVMQGKÞ-EFTDHLTHKLKHHÞGQIEA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    -----AHTLDHSATRAAMLVRINTLLQGYSGIRFEILEAISKFLNHNITPCLPLRGTIT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             VREELG---
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    VREELGVKARRGDVFLGKQEVTIGSNVSRIYEAIKSGRI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             GENEKNASTSIFQKITAFEEELKTILPKEVESA-RAAYESGNAAIPNRIVECRSYPLYKF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ELHPSRFCEKDLLMVVER-EYLFAYIDDP-----CSATYPLMQRLRQ----VLVEHALTN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           LISARRTAEANDVLSLLLATHLYCVLQAVDLRAMEFEFKKQFXPXXXXLLXQHFGXXXXX
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          AAIMEHILDGSSY-VKAAEKLHEQDPLQKPKQDRYALRTSPQWLGPQIE--VIRFSTKSI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ASGDLSPLSYIAAAITGHPDSKVHVXHEGXEKIMXAREAIALFGLEP--VVLGPKEGLGL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       YNNGLPSNLSGGRDPSLDYGFKGAETAMASYCSELQFLANPYTNHVQSAEQHNQDVNSLG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ARNIRTLLEGSXFAVHHEEEVKVKDDEGILRQDRYPLRTSPQWLGPLVSDMIHAHAVLSL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ASGDLVPLSYTAGLLTGRPNSKA-VGPKG-
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    XLGRGLENSLPLEVVRGAMTIRVNSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTIS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             GEFLTGEKVRSPGEECDKVFTAMCQGNI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        -WKVAXAEKAIS--LTRXVRXXFWXAPSSSSPAL--XYLSPRTRVLYSF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Last sequence update)
Last annotation update)
(EC 4.3.1.5).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Created)
                                                                                                                                                                                                                                                                                  Srinivas B., ophenylalanine
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     708
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     - ETLNAAEAFAQVGISSGFFELQPKEGLAL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     A
                                                                                                                                                                                                                                                                                                         Chun
                                                                                                                                                                                                                                                                                  ammonia-lyase
                                                                                                                                                                                                                                                                                                           ч
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      717
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                711
                                                                                                                                                                                                                                                                                                              <u>.</u>
                                                                                                                                      IEA
                                                                                                                                                                                                                                                                                     gene
                                                                                                                                                                                                                                                                                       Ħ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               677
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        678
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 618
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          633
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           573
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  513
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             448
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 388
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   568
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       508
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      454
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         335
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  272
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        395
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   331
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             275
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      215
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               217
      Š
                                                                                                                                                                                                                                                                                                                                                                                                               B
                                                                                                                                                                                                                                                                                                                                                                                                                                                 δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                ద
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         18
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Query Match
Best Local S
Matches 253
01-JUN-2002 (TrEMBLrel. 21, Created)
01-JUN-2002 (TrEMBLrel. 21, Last sequence upd
01-OCT-2003 (TrEMBLrel. 25, Last annotation u
Phenylalanine ammonia-lyase (EC 4.3.1.5) (Fra
PALI.
Pinus sylvestris (Scots pine).
Eukaryota, Viridiplantae; Streptophyta; Embry
Spermatophyta; Coniferopsida; Coniferales; Pi
NCBI_TaxID=3349;
                                                                                                                                                                                                 Q8RUZ3;
                                                                                                                                                                                                                          Q8RUZ3
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Lyase.
SEQUENCE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Pfam; PF00221; PAL; 1.
TIGRPAMS; TIGR01226; phe_am_lyase; 1.
PROSITE; PS00488; PAL HISTIDASE; 1.
PROSITE; PS00012; PHOSPHOPANTETHEINE;
                                                                                                                                                                                                                                                                9
                                                                                                                                                                                                                                                                                                                                                                           969
                                                                                                                                                                                                                                                                                                                                                                                                                    627
                                                                                                                                                                                                                                                                                                                                                                                                                                                             638
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      577
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              588
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       517
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             397
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                544
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           457
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    484
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      425
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   338
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          365
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   280
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              305
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         222
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                246
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           163
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 110
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    186
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        126
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   50
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            83
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Similarity
                                                                                                                                                                                                                                                                                                                              EKVVSPGEECDKVFTALSKGLIVDPLLKCL
                                                                                                                                                                                                                                                                                                                                                                         KQEVTIGSNVSRIYEAIKSGRINXVLVKML
                                                                                                                                                                                                                                                                                                                                                                                                                      ESARIAL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      GTYPLMQKLRQVLVDHALNNGESEKN----VSTSIFQKIEAFE----
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              ----LXKRLEQT-----NSYDLEPRWHDAFSXATGTVVEXLSSXXXXXVSLAAVNAWKV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                LRAME----FEFKKQFXPXXXXLLXQHF-GXXXTXXXXXXELXXKVXKX--------
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         YTSELGHLANPVTTHVQPAEMGNQAVNSLALISARRTAEANDVLSLLLLATHLYCVLQAVD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                GXEKIMXAREAIALFGLEPVV-LGPKEGLGLVNGTAVSASMATLALHDAHMLSLLSQALT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GYSGIRFEILEALTKFLNHNITPCLPLRGTITASGDLVPLSYIAGLLTGRPNSKA-VGPN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAITGHPDSKVHVXHE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             TSHRRTKQGGALQKELIRFLNAGIFGNGTES-----NHALPHSATRAAMLVRINTLLQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ELDGYSLTLGDVVGAARKGRXVRVXDSDEIRXKIDKSVEFLRXQLXNSV--YGVTTGFGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                             AXAEKAISLTRXVRXXFWXAPSSSSPAL--XYLSPRTRVLYSFVREELGVKARRGDVFLG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          LRHLEENLRLSVKNTVSQVAKRTLTMGINGELHPSRFCEKDLLRVVDREYVFAYIDDPCS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           YCSELQFLANPVTNHVQSAEQHNQDVNSLGLISSRKTVEALDILKLMSSTYLIALCQAVD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             I GVSMDNTRLAIAAI GKLMFAQFSEL VNDFYNNGLPSNLSGGRNPSLDYGFKGSEI AMAS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    VXNTMEKTRLALIGKLNFTQLTEMLNAGMNRGLPSCLA-AEDPSLSYHCKGLDIAAAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 PKQDRYALRTSPQWLGPQIEVIRTATKMIEREI-NSVNDTPLIDVSRNKALHGGNFQGTP
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          LRODRYPLRTSPOWLGPLVSDMIHAHAVLSLEAGOSTTDNPLIDVENKXTHHGGNFQASA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   VIFAEVMNGKP-EFTDHLTHKLKHHPGQIEAAAIMEHILDGSAY-VKAAQKLHETDPLQK
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              ALTVEAMVGHAGSFHPFLHDVTRPHPTQIEVARNIRTLLEGSXFAVHHEEEVKVKDDEGI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        SADTRTEDAISLOKALLEHQLCGVLPTSXDSFXLGRGLENSLPLEVVRGAMTIRVNSLTR
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   KLGGESLTIAQVAAIAARDNAVAVELAETARAGVKASSDWVMESMNKGTDSYGVTTGFGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         708
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       PRELIMINARY;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Conservative 103;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       AA;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       76835 MW;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         28.4%;
                                                                                                        Created)
Last sequence update)
Last annotation update)
(EC 4.3.1.5) (Fragment)
                                                                                                                                                                                                                                                                                                                                                                                                                    ---ESGNPAIGNRITECRSYPLYKFIREELGT----
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Score 954; DB 1
Pred. No. 1.3e-6
03; Mismatches 2
                                                                                                                                                                                                                       PRT;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1B6AF08816F1B8FE
                                                                                                                                                                                                                          681
                           Embryophyta;
es; Pinaceae;
                                                                                                                                                                                                                                                                                                                                697
                                                                                                                                                                                                                                                                                                                                                                           725
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         DB 10;
.3e-66;
                                                                                                                                                                                                                       B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       260;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CRC64;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Indels
                               Tracheophyta;
Pinus.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        -VELKAILPKEV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     74;
                                                                                                                                                                                                                                                                                                                                                                                                                      -NYLTG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            125
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          424
```

221 245 162 185 109

18

695 626 637 576 587 516 543 456 483 396

667

밁 8

Ş 덩 δ 유성

B 5 Вb 8 g Ś 밁 δ 멼 Ś 밁

```
멍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 SARARA DO DA RACIDA RAC
                                    8
                                                                                             B
                                                                                                                                               Ş
                                                                                                                                                                                                                                        8
                                                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                                             8
                                                                                                                                                                                                                                                                                                                                                                                                                                           Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                밁
                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Query Match
Best Local Similarity
Matches 214; Conserv
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Pfam; r:
TIGRFAMS; TIGRULL
TOSTITE; PS00488; F
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Lyase.
NON_TER
NON_TER
SEQUENCE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   GO; GO:0005737; C:cytoplasm; IEA.
GO; GO:0016211; F:ammonia ligase activity; IEA.
GO; GO:0016829; F:lyase activity; IEA.
GO; GO:0045548; F:phenylalanine ammonia-lyase activity;
GO; GO:000958; F:phenylalanine catabolism; IEA.
GO; GO:0009559; P:phenylalanine catabolism; IEA.
InterPro; IPR008948; L-Aspartase-like.
InterPro; IPR001106; Phe/His NH3lyase.
InterPro; IPR001106; Phe/His NH3lyase.
InterPro; IPR001106; Phe/His NH3lyase.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    MEDLINE=21660210; PubMed=11801746;
Dvornyk V., Sirvio A., Mikkonen M., Savolainen
"Low Nucleotide Diversity at the pall Locus in
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Pinus sylvestris.
Mol. Biol. Evol.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   SEQUENCE FROM N.A.
STRAIN=Various strains
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Pro; IPkuvsz: 1.
Pr00721; PAL; 1.
AMS; TIGR01226; phe am lyase; 1.
Pr00488; PAL_HISTIDASE; 1.
     397
                                                 422
                                                                                                                                                                                                   284
                                                                                                                                                                                                                                                                                                                                                                                                  167
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 69
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          LDGYSLTLGDVVGAARKGRXVRVXDSDEIRXKIDKSVEFLRXQLX--NSVYGVTTGFGGS
GTPIGVSMDNLRISISAIGKLMFAQFSELVNDYYNGGLPSNLSGGPNPSLDYGLKGAEIA
                                              ASAVXNTMEKTRLALIGKLNFTQLTEMLNAGMNRGLPSCLA-AEDPSLSYHCKGLDIA
                                                                                                                                                                                              MFCEVMNGKPEFTDPLTHKL-KHHPGQMEAAAIMEYVLDGSSYMKHAAKLHEMNPLQKP-
                                                                                                                                                                                                                                             LTVEAMVGHAGSFHPFLHDVTRPHPTQIEVARNIRTLLEGSXFAVH----HEEEVKVKDD
                                                                                                                                                                                                                                                                                                                                           XEKIMXAREAIALFGLE-PVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLSQALTA
                                                                                                                                                                                                                                                                                                                                                                                            YSGIRWDILETVEKLLNAGLTEKLPLRGTITASGDLVPLSYIAGLLTGRENSRVR-SRDG
                                                                                                                                                                                                                                                                                                                                                                                                                                              HSAVRLVVLEALTNFLNHGITFIVPLRGTISASGDLSPLSYIAAAITGHPDSKVHVXHEG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             SHRRTNQGAELQKELIRFLNAGV------LGKCPENVLSEDTTRAAMLVRTNTLLQG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            ADTRTEDAISLOKALLEHQLCGVLPTSXDSFXLGRGLENSLPLEVVRGAMTIRVNSLTRG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             IEGKŚLTISOVAAVARRSQVKVKLDAEAAKSRVEESSNWVLTQMTKGTDTYGVTTGFGAT
                                                                                                                                               EGILRODRYPLRTSPOWLGPLVSDMIHAHAVLSLEAGOSTTDNPLIDVENKXTHHGGNFO
                                                                                                                                                                                                                                                                                              IE--MSGAEALKKVGLEKPFELQPKEGLAIVNGTSVGAALASIVCFDANVLALLSEVISA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              681
681 AA;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Conservative
                                                                                                -KODRYALRTSPOWLGPOVETTRSATHMTERET-NSVNDNPVIDVARDKALHGGNFO
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            681
74365 MW;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                28.1%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              85;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Score 944.5; DB 10; Length Pred. No. 7e-66; S; Mismatches 162; Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              5B4521F7978BF804 CRC64;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       O.;
the Widely Distributed
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          681;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              27;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Gaps
  456
                                              480
                                                                                                396
                                                                                                                                               421
                                                                                                                                                                                                 341
                                                                                                                                                                                                                                             361
                                                                                                                                                                                                                                                                                              283
                                                                                                                                                                                                                                                                                                                                             305
                                                                                                                                                                                                                                                                                                                                                                                                                                              246
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               166
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            186
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             115
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               126
                                                                                                                                                                                                                                                                                                                                                                                            225
```

```
RESULT 10
Q852S1
ID Q852S
AC Q852S
                                                                                                                                                                                                                                                                                                                                                                                                                Š
                                                                 밁
                                                                                              Š
                                                                                                                                      밁
                                                                                                                                                               δ
                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ó
                                                                                                                                                                                                                                    á
                                                                                                                                                                                                                                                                                                         S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  8
                                                                                                                                                                                                                                                                                                                                                                                                                            T pathway. ";

It pathway. ";

It Submitted (AUG-2002) to the EMBL/GenBank/DDBJ databases.

It Submitted (AUG-2002) to the EMBL/GenBank/DDBJ databases.

It EMBL, AB009813; BAC56977.1; -.

It GO; GO:0005737; C:cytoplasm; IEA.

It GO; GO:0005231; F:ammonia ligase activity; IEA.

It GO; GO:0016821; F:phenylalanine ammonia-lyase activity; IEA.

It GO; GO:00045548; F:phenylalanine ammonia-lyase activity; IEA.

It GO; GO:0005559; P:phenylalanine catabolism; IEA.

It GO; GO:0005559; P:phenylalanine catabolism; IEA.

InterPro; IPR001948; L-Aspartase-like.

InterPro; IPR001948; L-Aspartase-like.

InterPro; IPR001948; Phe-Mis NH3lyase.

InterPro; IPR001948; Phe-Mis NH3lyase.

InterPro; IPR001921; Phe-milyase.

INTERPAMS; TIGR01226; Phe-am_lyase; 1.

INTERPAMS; TIGR01226; Phe-am_lyase; 1.

INTERPAMS; TIGR01226; Phe-am_lyase; 1.
                                                                                                                                                                                                                                                                                                                                           Query Match
Best Local S
Matches 251
                                                                                                                                                                                                                                                                                                                                                                                                                Lyase.
SEQUENCE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     STRAIN=cv. Kurodagosun;
Ozeki Y., Chikagawa Y., Kimura S., Soh H., Maeda K., Pornsiriwong
Kato M., Akimoto H., Oyanagi M., Fukuda T., Koda T., Itoh Y.,
Yamada A., Ueno H., Takeda J.;
"Putative cis-elements in the promoter region of phenylalanine
ammonia-lyase gene of carrot involved in anthocyanin biosynthetic
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Eukaryota; Viridiplantae; Streptophyta; Embryophyta; Tracheophyta; Spermatophyta; Magnoliophyta; eudicotyledons; core eudicots; aster campanulids; Apiales; Apiaceae; Apioldeae; Scandiceae; Daucinae;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Phenylalanine ammonia-lyase GDCPAL3.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 01-JUN-2003 (TrEMBLrel. 24,
01-JUN-2003 (TrEMBLrel. 24,
01-OCT-2003 (TrEMBLrel. 25,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Q852S1
Q852S1;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            SEQUENCE FROM N.A.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           NCBI_TaxID=4039;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Daucus carota (Carrot).
                                                                                                                                                                                                                                                                                                                            Mac
Local by
251;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       517
                                  300
                                                                   224
                                                                                                                                      165
                                                                                                                                                                    182
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        541
                                                                                                                                                                                                       114 ATSHRTTKQGGALQKELIRFLNAGI-----FGSGAEAGNNTLPHSATRAAMLVRIN
                                                                                                                                                                                                                                       125
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         481
                                                                                                                                                                                                                                                                                                          8
                                                                                                                                                                                                                                                                          54
                                                                                                                                                                                                                                                                                                                                         Similarity 36.0
51; Conservative
                                                                                      VXHEGXEKIMXAREAIALFGLEP--VVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLL
                                                                                                                                                                                                                                                                          KLGGETLTISQVAAISARDDSGVKVELSEAARAGVKASSDWVMESMNKGTDSYGVTTGFG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       AVDLRHLE
AEVMSAIFAEVMQGKP-EFTDHLTHKLKHHPGQIEAAAIMEHILDGSAY-VKAAQKLHEM
                                SQALTALTVEAMVGHAGSFHPFLHDVTRPHPTQIEVARNIRTLLEGSXFAVHHEEEVKVK
                                                                                                                                      TLLQGYSGIRFEILEAITKFLNHNITPCLPLRGTITASGDLVPLSYIAGLLTGRPNSKA-
                                                                                                                                                                    SLTRGHSAVRLVVLEALTNELNHGITPIVPLRGTISASGDLSPLSYIAAAITGHPDSKVH
                                                                                                                                                                                                                                    GSADTRTEDAISLOKALLEHQLCGVLPTSXDSFXLGRGLE---NSLPLEVVRGAMTIRVN
                                                                                                                                                                                                                                                                                                         ELDGYSLTLGDVVG-AARKGRXVRVXDSDEIRXKIDKSVEFLRXQLXNSV--YGVTTGFG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        AVDLRAME
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          MASYTSELLYLANPVISHVQSAEQHNQDVNSLGLVSARKSAEAIDILKLMLSTYLTALCQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         AAAYTSELGHLANPVTTHVQPAEMGNQAVNSLALISARRTAEANDVLSLLLATHLYCVLQ
                                                                                                                                                                                                                                                                                                                                                                                                            715 AA;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      PRELIMINARY;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         524
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          548
                                                                                                                                                                                                                                                                                                                                                                                                              77802 MW; 8D067795D57565B4 CRC64;
                                                                                                                                                                                                                                                                                                                                         28.1%; Score 944.5; 36.0%; Pred. No. 7.5e tive 111; Mismatches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Created)
Last sequence update)
Last annotation update)
(EC 4.3.1.5).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      715
                                                                                                                                                                                                                                                                                                                                                           .5e-66;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Å
                                                                                                                                                                                                                                                                                                                                                                        DB_10; Length 715;
                                                                                                                                                                                                                                                                                                                                             250;
                                                                                                                                                                                                                                                                                                                                             Indels
                                                                                                                                                                                                                                                                                                                                             85
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 asterids;
                                                                                                                                                                                                                                                                                                                                         Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Σ,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          516
                                                                                                   299
                                                                                                                                                                    241
                                                                                                                                                                                                       164
                                                                                                                                                                                                                                         181
                                                                                                                                                                                                                                                                          113
                                                                                                                                                                                                                                                                                                          124
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           540
                                                                 281
                                                                                                                                                                                                                                                                                                                                             19;
```

```
RESULT
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
OR SALE
Query Match
Best Local S
Matches 214
                                                                                                                                                                                  Pinus sylvestris.";

Mol. Biol. Evol. 19:179-188(2002).

RMEL; AF353981; ALT/4331.1;

GO; GO:0005737; C:cytoplasm; IEA.
GO; GO:0016211; F:ammonia ligase activity; IEA.
GO; GO:0016829; F:lyase activity; IEA.
GO; GO:0016829; F:lyase activity; IEA.
GO; GO:0045548; F:phenylalanine ammonia-lyase activity; IEA.
GO; GO:0045548; F:phenylalanine activity; IEA.
GO; GO:0005059; P:phenylalanine catabolism; IEA.
InterPro; IPR008948; L-Aspartase-like.
InterPro; IPR008948; L-Aspartase-like.
InterPro; IPR008948; L-Aspartase-like.
InterPro; IPR008948; L-Aspartase-like.
InterPro; IPR008948; L-Aspartase-like.
InterPro; IPR008948; L-Aspartase-like.
InterPro; IPR008948; L-Aspartase-like.
INTERPAMS; TIGR01226; phe am_lyase.
ITGRFAMS; TIGR01226; phe am_lyase; 1.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Q8SAS6;
Q8SAS6;
01-JUN-2002
01-JUN-2002
01-OCT-2003
                                                                                  Lyase.
NON_TER
NON_TER
SEQUENCE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            STRAIN=Kir30;
MEDLINE=21660210; PubMed=11801746;
Dvornyk V., Sirvio A., Mikkonen M., Savolainen
"Low Nucleotide Diversity at the pall Locus in
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Pinus sylvestris (Scots pine).
Eukaryota; Viridiplantae; Streptophyta; Embryophyta;
Spermatophyta; Coniferopsida; Coniferales; Pinaceae;
                                                                                                                                                                       PROSITE;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        NCBI_TaxID=3349;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Phenylalanine
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     SEQUENCE FROM N.A.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           11
Local Similarity 43. les 214; Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       479
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   340
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             670
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                614
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    561
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              585
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         519
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                539
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            459
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              399
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       420
                                                                                                                                                                       PS00488;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CEKDLLRVVDREYIFAYIDDPCSATYPLMQKLRE-----TLVEHALNNGDKERNLSTS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            FQASAVXNTMEKTRLALALIGKLNFTQLTEMLNAGMNRGLPSCLA-AEDPSLSYHCKGLD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     DPLQKPKQDRYALRTSPQWLGPQI-EVIRSSTKMIEREINSVNDNPLIDVSRNKAIHGGN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 DDEGILRODRYPLRTSPQWLGPLVSDMIHAHAVLSLEAGQSTTDNPLIDVENKXTHHGGN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             IFQKIAAFEDELKALLPKEVESA-RAAVESGNPAIPNRIKECRSYPLYKFVREELGT---
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       NAWKVAXAEKAIS--LTRXVRXXEWXAPSSSSPAL--XYLSPRTRVLYSFVREELGVKAR
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CQAIDLRHLEENLK--
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                LQAVDLRAMBFEFKKQFXPXXXXLLXQHFGXXXTXXXXXXELXXKV-------
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            IAMASYCSELQFLANPVTNHVQSAEQHNQDVNSLGLISSRKTSEAVEILKLMSTTFLVGL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             --- EYLTGEKVTSPGEEFDKVFTAMTKGEIIDPLLECL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  RGDVFLGKQEVTIGSNVSRIYEAIKSGRINXVLVKML
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              -XKXLXKRLEQ----
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   IAAAAYTSELGHLANPVTTHVQPAEMGNQAVNSLALISARRTAEANDVLSLLLATHLYCV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              FOGTPIGVSMONTRLAIAAIGKLMFAQFSELVNDFYNNGLPSNLSGGRNPSLDYGFKGAE
                                                                                  189
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          (TrEMBLrel.: (TrEMBLrel.:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      (TrEMBLrel. 21, (TrEMBLrel. 21, 1) (TrEMBLrel. 25, 1) (TrEMBLrel. 25, 1) e ammonia-lyase
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    PRELIMINARY;
                                                                                  ĀĀ,
                                                                                                                                                                26; phe_am_lyase; 1.
PAL_HISTIDASE; 1.
                                                                                  681
74341 MW;
                  28.0%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              ----TNSYDLEPRWHDAFSXATGTVVEXLSSXXXXXVSLAAV
  85;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Last sequence update)
Last annotation update)
(EC 4.3.1.5) (Fragment)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Created)
Score 943.5; DB 10; Length Pred. No. 8.4e-66; Indels 5; Mismatches 162; Indels
                                                                                    5BFCE337969FFBD0 CRC64;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         -----STVKNTVSQVAKRVLTMGVNGELHPSRF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    189
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 $
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 the
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             704
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      725
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Widely Distributed
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Tracheophyta;
Pinus.
                                                                                                                                                                                                                                                                                                                                                IEA.
                                           681;
  27;
Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           883
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    669
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    613
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              632
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         560
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            518
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       538
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                458
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          478
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     398
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              419
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     584
  10;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   RESULT 12
Q9MAX1
    5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ş
                                                         EMBL; ABA04220; EAA95629.1; -
EMBL; ABA04220; EAA95629.1; -
GO: GO:0005737; C:Cytoplasm; IEA.
GO: GO:0016211; F:ammonia ligase activity; IEA.
GO: GO:0016241; F:ammonia-lyase activity; IEA.
GO: GO:0016829; F:lyase activity; IEA.
GO: GO:0006829; F:lyase activity; IEA.
GO: GO:0009058; P:biosynthesis; IEA.
GO: GO:0009058; P:biosynthesis; IEA.
GO: GO:00090592; P:phenylalanine catabolism; IE.
InterPro; IPR00106; Phe/Hig NH31yase.
InterPro; IPR005922; Phe am_lyase.
Pfam; PF00221; PAL; 1.
TIGREAMS; TIGR01226; phe am_lyase; 1.
  Lyase.
SEQUENCE
                                                                                                                                                                                                                                                                                                                                              SEQUENCE FROM N.A.

KIYOCA S., Sakano K., Kim J.;

"CDNA of phenylalanine ammmonia lyase from Cat
submitted (MAY-2000) to the EMBL/GenBank/DDBJ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Cathàranthus roseus (Rosy periwinkle) (Madagascar periwinkle), Eukaryota; Viridiplantae; Streptophyta; Embryophyta; Tracheophyta; Epermatophyta; Monollophyta; edicotyledons; core eudicots; asterids; lamiids; Gentianales; Apocynaceae; Rauvolfioideae; Vinceae;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   PROSITE;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 lamiids; Gentianales;
Catharanthus.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Q9MAX1
                                                                                                                                                                                                                                                                                                                                                                                                                                                     NCBI_TaxID=4058;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Q9MAX1;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     167
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       116
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      541
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             457
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         481
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    397
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           422
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       342
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  362
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         284
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       306
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              226
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         247
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            187
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 127
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             517
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            56
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   69
                                           ; TIGR01226; phe_am_lyase; PS00488; PAL_HISTIDASE; 1.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   SHRRTNQGAELQKELIRFLNAGV------LGKCPENVLSEDTTRAAMLVRTNTLLQG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   MASYTSELLYLANDVTSHVQSAEQHNQDVNSLGLVSARKSAEAIDILKLMLSTYLTALCQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             AAAYTSELGHLANPVTTHVQPAEMGNQAVNSLALISARRTAEANDVLSLLLATHLYCVLQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  GTPIGVSMDNLRLSISAIGKLMFAQFSELVNDYYNGGLPSNLSGGPNPSLDYGLKGABIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           EGILRODRYPLRTSPOWLGPLVSDMIHAHAVLSLEAGQSTTDNPLIDVENKXTHHGGNFQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              MFCEVMNGKPEFTDPLTHKL-KLHPGQMEAAAIMEYVLDGSSYMKHAAKLHEMNPLQKP-
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     YSGIRWDILETVEKLLNAGLTPKLPLRGTITASGDLVPLSYIAGLLTGRPNSRVR-SRDG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            HSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAITGHPDSKVHVXHEG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               LDGYSLTLGDVVGAARKGRXVRVXDSDEIRXKIDKSVEFLRXQLX--NSVYGVTTGFGGS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             AVDLRHLE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    AVDLRAME
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           ASAVXNIMEKTRLALALIGKLNFTQLTEMLNAGMNRGLPSCLA-AEDPSLSYHCKGLDIA 480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ----KQDRYALRTSPQWLGPQVEIIRSATHMIEREI-NSVNDNPVIDVARDKALHGGNFQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  LTVEAMVGHAGSTHPFLHDVTRPHPTQIEVARNIRTLLEGSXFAVH----HEEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                IE--MSGAEALKKVGLEKPFELQPKEGLAIVNGTSVGAALASIVCFDANVLALLSEVISA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  XEKIMXAREAIALFGLE-PVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLSQALTA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ADTRTEDAISLOKALLEHQLCGVLPTSXDSFXLGRGLENSLPLEVVRGAMTIRVNSLTRG
    716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   PRELIMINARY;
    ΑA;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      548
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             524
      78241 MW;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   PRT;
      1F16D4DEB8683B0B CRC64;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   8
                                                                                                                                                                                                                                           ; IEA.
                                                                                                                                                                                                                                                                                                                                                                          Catharanthus
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            update)
                                                                                                                                                                              ΙEΑ
                                                                                                                                                                                                                                                                                                                                                     databases
                                                                                                                                                                                                                                                                                                                                                                       roseus.";
```

516

540 456 421

341 361 283 305 225 246 166

396

5 В Ş 뫄 Ś Дb Ś 뮍 δ 뮍 8 밁

```
Q8RV4
AC Q8RV4
AC Q8RV4
AC Q8RV4
AC Q8RV4
DT 01-U
DT 01-U
DT 01-O
DE Phens
GN PALL
OS Pinus
OC Eukas
OC Sperm
OX NCB1:
RN (1)
RRN (1)

                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Query Match 28.0
Best Local Similarity 35.7
Matches 256; Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                    QBRV49 PRELIMINARY;
QBRV49;
O1-JUN-2002 (TrEMBLrel. 21,
O1-JUN-2002 (TrEMBLrel. 21,
O1-OCT-2003 (TrEMBLrel. 25,
STRAIN=Kol3, and Kol4;
MEDLINE=21660210; PubMed=11801746;
Dvornyk V., Sirvio A., Mikkonen M., Sa
"Low Nucleotide Diversity at the pall
Pinus sylvestris.";
                                                                                                                                                                                                                                                                Pinus sylvestris (Scots pine).
Eukaryota, Viridiplantae, Streptophyta, Embryophyta,
Spermatophyta, Coniferopsida, Coniferales, Pinaceae,
                                                                                                                                                                           SEQUENCE FROM N.A.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   508
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      429
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   449
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       333
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       88
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           40
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       99
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       29
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      FXLGRGLENS--LPLEVVRGAMTIRVNSLTRGHSAVRLVVLEALTNFLNHGITÞIVÞLRG
--FGNGTESSHTLÞHSATRAMLVRINTLLQGYSGIRFEILEAITKFLNHNITÞCLÞLRG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             GSXLPTTXXTQLDIVEXXLADPXTDDXXELDGYSLTLGDVVG-AARKGRXVRVXDSDEIR
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           DVNSLGLISSRKTAEAVEILKLMSSTYLVALCQAIDLRHLEENLKNAVKNTVSQVAKRTL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   AVNSLALISARRTABANDVLSLLLATHLYCVLQAVDLRAMEFEFEKKQFXPXXXXLLXQHF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               ELVNDFYNNGLPSNLSGGRNPSLVYGFKGAEIAMASYCSELQYLANPVINHVQSAEQHNQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                ATKMIEREI-NSVNDNPLIDVSRNKALHGGNFQGTPIGVSMDNARLAIASIGKLMFAQIS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         AHAVISLEAGQSTTDNPLIDVENKXTHHGGNFQASAVXNTMEKTRLALALIGKLNFTQLT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         IEVARNIRTLLEGSXF--AVH--HEEEVKVKDDEGILRQDRYPLRTSPQWLGPLVSDMIH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           LALVNGTAVGSGMASMVLFEANILAVLSEVLSAIFAEVMNGKP-EFTDHLTHKLKHHPGQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       GMAADSLKGSHLDEVKRMVAE-FRKPVVKLGGETLTISQVAAIAARDYNAVKVELSEDAR
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ECRSYPLYKFVREDVG-----AEFLTGEKDRSPGEEFDKVFTAMCNEKIIDPLLECL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   SPRTRVLYSFYREELGVKARRGDVFLGKQEVTIGSNVSRIYEAIKSGRINXVLVKML
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           QVIVDHALQNGESEKNVNTSIFQKIAAFEDELKTVLPKEVESA-RTALENGNPAIPNRIK 653
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           --VVEXLSSXXXXXVSLAAVNAWKVAXAEKAIS--LTRXVRXXFWXAPSSSSPAL--XYL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               TVGVNGELHPSRFCEKDLIRVVDR-----EYVFAYVDDP-----CSGTYPLMEKLR
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                EMINAGMNRGIPSCLA-AEDPSISYHCKGIDIAAAAYTSELGHLANPVTTHVQPAEMGNQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       IEAAAIMEHILDGSGYVKAAHKLHEMDPLQKP-----KQDRYALRTSPQWLGPQIEVIRS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        LGLVNGTAVSASMATLALHDAHMLSLLSQALTALTVEAMVGHAGSFHPFLHDVTRPHPTQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            TISASGDLSPLSYIAAAITGHPDSKVHVXHEGXEKIMXAREAIALFGLEPVV--LGPKEG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   AGVKASSDWVMESMNKGTDSYGVTTGFGATSHRRTKQGGALQKELIRFLNAGI-----
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   XKIDKSVEFLRXQLXNSV--YGVTTGFGGSADTRTEDAISLQKALLEHQLCGVLPTSXDS
                                                                                                                                                                                                                                                                                                                                                                                                               ammonia-lyase
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               GXXXTXXXXXXELXXKVXXXXLXKRLEQTNSYDLEPRWHDAFSXATGT------
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                28.0%; Score 942.5; DB 10; 35.7%; Pred. No. 1.1e-65; tive 120; Mismatches 270;
                                                                                                                                                                                                                                                                                                                                                                                                        Last sequence update)
Last annotation update)
(EC 4.3.1.5) (Fragment).
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Created)
                                   Savolainen
ll1 Locus in
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      681
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Å
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    DB 10; Length
                                       the
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Indels
                                       Widely
                                                                                                                                                                                                                                                                              Tracheophyta;
Pinus.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           716;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       725
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       198
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              999
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               614
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   548
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   567
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   488
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       507
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       428
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       448
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       369
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               332
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               255
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               272
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   140
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       156
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       87
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   SET TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO REPORT TO
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Db
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       밁
```

```
RESULT 14
Q8RWF
ID Q8RWF
AC Q8RWF
AC Q8RWF
DT 01-JU
DT 01-JU
DT 01-GC
DB Pheny
GN AT3G5
OC EUKar
OC Sperm
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Query Match
Best Local Simi
Matches 214;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  EMBL; AP353974; AAL74324.1;

EMBL; AR353975; AAL74325.1;

GO; GO:0005737; C:Cytoplasm; IEA.
GO; GO:0005737; C:Cytoplasm; IEA.
GO; GO:0016211; F:ammonia ligase activity; IEA.
GO; GO:0016829; F:lyase activity; IEA.
GO; GO:0045548; F:phenylalanine ammonia-lyase activity; IEA.
GO; GO:0009058; P:biosyntheeis; IEA.
GO; GO:0006559; P:phenylalanine catabolism; IEA.
GO; GO:0006559; P:phenylalanine catabolism; IEA.
GO; GO:0006559; P:phenylalanine catabolism; IEA.
GINTERTO; IER001106; P:ASpartase-like.
InterPro; IER001106; P:ASpartase-like.
InterPro; IER001106; P:ASpartase-like.
InterPro; IER005106; P:ASpartase-like.
InterPro; IER005106; P: ASpartase-like.
INTERPAMS; TIGR01226; D: ASPACES; 1.
PROSITE; PS00488; PAL_HISTIDASE; 1.
                                                            Q8RWP4;
01.JUN-2002 (TrEMBLrel. 21, Created)
01.JUN-2002 (TrEMBLrel. 21, Last sequence up
01-JCT-2003 (TrEMBLrel. 25, Last annotation
Phenylalanine ammonia-lyase.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Mol. Biol. Evol.
EMBL; AF353974; A
EMBL; AF353975; A
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Lyase.
NON_TER
NON_TER
SEQUENCE
                                                                                                                                                                                            Q8RWP4
                                                                                                                                                                                                                                                                                                   517
                                                                                                                                                                                                                                                                                                                                                                                    457
                                                                                                                                                                                                                                                                                                                                                                                                                              481
                                                                                                                                                                                                                                                                                                                                                                                                                                                                     397
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             284
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         187
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 69 LDGYSLTLGDVVGAARKGRXVRVXDSDEIRXKIDKSVEFLRXQLX--NSVYGVTTGFGGS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Similarity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GTPIGVSMDNLRLSISAIGKLMFAQFSELVNDYYNGGLPSNLSGGPNPSLDYGLKGABIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           MFCEVMNGKPEFTDPLTHKL-KHHPGQMEAAAIMEYVLDGSSYMKHAAKLHEMNPLQKP-
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 LTVEAMVGHAGSFHPFLHDVTRPHPTQIEVARNIRTLLEGSXFAVH----HEEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     ADTRTEDAISLQKALLEHQLCGVLFTSXDSFXLGRGLENSLFLEVVRGAMTIRVNSLTRG
                                                                                                                                                                                                                                                                                                                                                                                                                          AAAYTSELGHLANPYTTHVQPAEMGNQAVNSLALISARRTAEANDVLSLLLATHLYCVLQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    ASAVXNTMEKTRIALALIGKLNFTQLTEMLNAGMNRGLPSCLA-AEDPSLSYHCKGLDIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             XEKIMXAREAIALFGLE-PVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLSQALTA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 YSGIRWDILETVEKLINAGLTPKLPLRGTITASGDLVPLSYTAGLLTGRPNSRVR-SRDG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                HSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAITGHPDSKVHVXHEG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               SHRRINGGAELQKELIRFLNAGV------LGKCPENVLSEDITRAAMLVRINTLLQG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    IEGKSLTISDVAAVARRSQVKVKLDVEAAKSRVEESSNWVLTQMTKGTDTYGVTTGFGAT
                                                                                                                                                                                                                                                                                                                                         AVDIRAME 548
                                                                                                                                                                                                                                                                                                                                                                                    MASYTSELLYLANDVTSHVOSAEQHNODVNSLGLVSARKSAEAIDILKLMLSTYLTALCO
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              IE--MSGAEALKKVGLEKPFELQPKEGLAIVNGTSVGAALASIVCFDANVLALLSEVISA
                                                                                                                                                                                                                                                                                                   AVDLRHLE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          ----KODRYALRTSPOWLGPOVEIIRSATHMIEREI-NSVNDNPVIDVARDKALHGGNFO
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              EGILRODRYPLRTSPOWLGPLVSDMIHAHAVLSLEAGOSTTDNPLIDVENKXTHHGGNFO
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        681
681 AA;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Conservative 84; Mismatches 163;
                                                                                                                                                                                            PRELIMINARY;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          19:179-188 (2002) .
                                                                                                                                                                                                                                                                                                   524
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1
681
74394 MW; 35E8A50EA8480286 CRC64;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         28.0%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Score
Pred.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              941.5;
No. 1.;
                                                                                                                                                                                              717
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              1.2e-65
                                                                                                                                                                                            $
                                                                                                                             update)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  DB
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   IEA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       27;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          396
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    421
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               341
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        305
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    166
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            186
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    115
                                                                                                                                                                                                                                                                                                                                                                                                                              540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                283
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   225
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           246
```

phenylalanine ammonia-lyase. AT3G53360. Arabidopsis thaliana (Mouse-ear cress). Arabidopsis thaliana (Mouse-ear cress). Eukaryota; Viridiplantae; Streptophyta; Embryophyta; Tracheophyta; Spermatophyta; Magnoliophyta; eudicotyledons; core eudicots; rosid

```
YN [2]

RP SEQUENCE FROM N.A.

AA Nguyen M., Karlin-Neumann G., Southwick A., Tripp M., Miranda M.,

AA Palm C.J., Bowser L., Jones T., Banh J., Carninci P., Chen H.,

AA Cheuk R., Chung M.K., Hayashizaki Y., Ishida J., Kamiya A., Kawai J.,

RA Kim C., Lin J., Liu S.X., Narusaka M., Pham P.K., Sakano H.,

RA Sakurai T., Satou M., Seki M., Shinn P., Yamada K., Shinozaki K.,

RA Ecker J., Theologis A., Davis R.W.;

Submitted (SEP-2002) to the EMBL/GenBank/DDBJ databases.

DR EMBL; AY092957; AAM12956.1; -.

DR EMBL; BY000035; AAM1354.1; -.

DR GG; GG:0016737; C:yttoplasm; IEA.

DR GG; GG:0016737; C:yttoplasm; IEA.

DR GG; GG:0016821; F:ammonia ligase activity; IEA.

DR GG; GG:0016821; F:ammonia-lyase activity; IEA.

DR GG; GG:0016821; F:ammonia-lyase activity; IEA.

DR GG; GG:0009058; P:blosynthesis; IEA.

DR GG; GG:0006559; P:phenylalanine catabolism; IEA.

DR GG; GG:0006559; P:phenylalanine catabolism; IEA.

DR InterPro; IPR001016; Phe/His MH31yase.

DR InterPro; IPR00105922; Phe_am_Tyase.
                   S B S
                                                                                                            DЬ
                                                                                                                                          8 8
                                                                                                                                                                                                    δ
                                                                                                                                                                                                                                             ₽
                                                                                                                                                                                                                                                                  8
                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                   8
                                                                                                                                                                                                                                                                                                                                                                     ఠ
                                                                                                                                                                                                                                                                                                                                                                                              Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                 B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              $
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Query Match
Best Local Similarity
Matches 250; Conser
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Southwick A., Karlin-Neumann G., Nguyen M., Lam B., Miranda M., Palm C.J., Bowser L., Jones T., Banh J., Carninci P., Chen H., Cheuk R., Chung M.K., Hayashizaki Y., Ishida J., Kamiya A., Kawai Kim C., Lin J., Liu S.X., Narusaka M., Pham P.K., Sakano H., Sakurai T., Satou M., Seki M., Shinn P., Yamada K., Shinozaki K., Bcker J., Theologis A., Davis R.W.; Submitted (MAR-2002) to the EMBL/GenBank/DDBJ databases.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Lyase.
SEQUENCE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         eurosids II; Brassicales;
NCBI_TaxID=3702;
[1]
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               SEQUENCE FROM
437
                                                           377
                                                                                         397
                                                                                                                                                                                   266
                                                                                                                                                                                                                                               209
                                                                                                                                                                                                                                                                            224
                                                                                                                                                                                                                                                                                                                                        164
                                                                                                                                                                                                                                                                                                                                                                                                      106
                                                                                                                                                                                                                                                                                                                                                                         96
                                                                                                                                                                                                                                                                                                                                                                                                                                    40
                                                                                                                                                                                                                                                                                                                                                                                                                                                                   49
                                                                                                                                                                                                                                                                                                        NNGLPSNLTASSNPSLDYGFKGAEIAMASYCSELQYLANPVTSHVQSAEQHNQDVNSLGL
                NRGLPSCI-AAEDPSISYHCKGLDIAAAAYTSELGHLANPVTTHVQPAEMGNQAVNSLAL
                                                         REINSVNDNPLIDVSRNKAIHGGNEQGTPIGVSMDNTRLAIAAIGKLMEAQESELVNDEY
                                                                                AG-QSTTDNPLIDVENKXTEHGGNFQASAVXNTMEKTRLALALIGKLNFTQLTEMLNAGM
                                                                                                                                                    LLEGSXF-----AVHHEEEVKVKDDEGILRQDRYPLRTSPOWLGPLVSDMIHAHAVLSLE
                                                                                                                                                                                   GSGMASMVLFEANVQAVLAEVLSAIFAEVMSGKP-EFTDHLTHRLKHHPGQIEAAAIMEH
                                                                                                                                                                                                            SASMATLALHDAHMLSLLSQALTALTVEAMVGHAGSFHPFLHDVTRPHPTQIEVARNIRT
                                                                                                                                                                                                                                             PLSYTAGLLTGRPNSKA-TGPDG--ESLTAKEAFEKAGISTGFFDLQPKEGLALVNGTAV
                                                                                                                                                                                                                                                                           PLSYIAAAITGHPDSKVHVXHEGXEKIMXAREAIALEGLEP--VVLGPKEGLGLVNGTAV
                                                                                                                                                                                                                                                                                                                                                                                         EFLRXQLXNSV--YGVTTGFGGSADTRTEDAISLQKALLEHQLCGVLPTSXDSFXLGRGL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                   TQLDIVEXXLAD----PXTDDXXELDGYSLTLGDVVGAARKGRXVRVXDSDEIRXKIDKSV
                                                                                                                                                                                                                                                                                                                                                                         DWVMESMNKGTDSYGVTTGFGATSHRRTKNGTALQTELIRFLNAGIFGNTKETC-----
                                                                                                                                                                                                                                                                                                                                                                                                                                    SHLDEVKKMVAEYRRPVVN----LGGETLTIGQVAAISTVGGSVKVELAETSRAGVKASS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              717 AA;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              77801 MW;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              27.9%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   122;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Brassicaceae;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Score 940; DB
Pred. No. 1.7e.
22; Mismatches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              C4C9CBDCDB91A838
                                                                                                                      KODRYALRTSPOWLGPQIE--VIRQATKSIE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Arabidopsis
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               DB 10;
..7e-65;
les 259;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CRC64;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               717;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 82;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Gaps
496
                                                           436
                                                                                                                        376
                                                                                                                                                      396
                                                                                                                                                                                                                 341
                                                                                                                                                                                                                                               265
                                                                                                                                                                                                                                                                            281
                                                                                                                                                                                                                                                                                                            208
                                                                                                                                                                                                                                                                                                                                                                         149
                                                                                                                                                                                                                                                                                                                                                                                                      163
                                                                                                                                                                                                                                                                                                                                                                                                                                    95
```

```
RESULT ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSEDA ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSEDA ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSEDA ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSEDA ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSED ACCESSEDA ACCESSEDA ACCESSEDA ACCESSEDA ACCESSEDA ACCESSEDA ACCESSEDA ACCESSEDA ACCESSEDA ACCESSEDA ACCESSEDA ACCESSEDA ACCESSEDA ACCESSEDA ACCESSEDA ACCESSEDA ACCESSEDA ACCESSEDA ACCESSEDA ACCESSEDA ACCESSEDA ACCESSEDA ACCESSEDA ACCESSEDA ACCESSEDA ACCESSEDA ACCESSEDA ACCESSEDA ACCESSEDA ACCESSEDA ACCESSEDA ACCESSEDA ACCESSEDA ACCESSEDA ACCESSEDA ACCESSEDA ACCESSEDA ACCESSEDA ACCESSEDA ACCESSEDA ACCESSEDA ACCESSEDA ACCESSEDA ACCESSEDA ACCESSEDA ACCESSEDA ACCESSEDA ACCESSEDA ACCESSEDA ACCESSEDA ACCESSEDA ACCESSEDA ACCESSEDA ACCESSEDA ACCESSEDA ACCESSEDA ACCESSEDA ACCESSEDA ACCESSEDA ACCESSEDA ACCESSEDA ACCESSEDA ACCESSEDA ACCESSEDA ACCESSEDA
                                                                                                                                                                                     Š
                                                                                                                                                                                                                                                                   밁
밁
                                            8
                                                                                                                                 밁
                                                                                                                                                                                                                                                                                                                                  8
                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ó
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Query Match
Best Local S
Matches 258
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 "Characterization of a second phenylalanine ammo in wounded lettuce leaf tissue."; Submitted (AUG-2001) to the EMBL/GenBank/DDBJ da EMBL; AP411134; AA013347.1; -
GO; GO:0005737; C:Cytoplasm; IEA.
GO; GO:0016211; F:ammonia ligase activity; IEA.
GO; GO:0016821; F:ammonia-lyase activity; IEA.
GO; GO:0016829; F:lyase activity; IEA.
GO; GO:000558; P:biosynthesis; IEA.
GO; GO:000559; P:phenylalanine catabolism; IEA.
InterPro; IPR0018946; L-Aspartase-like.
InterPro; IPR001905; P:Dhe-Missus-like.
InterPro; IPR001906; Phe/Hissus-like.
InterPro; IPR001906; Phe/Hissus-like.
InterPro; IPR001906; Phe/Hissus-like.
InterPro; IPR001906; Phe/Hissus-like.
InterPro; IPR001906; Phe-Missus-like.
InterPro; IPR01906; Phe-Missus-like.
InterPro; IPR01906; Phe-Missus-like.
InterPro; IPR01906
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Phenylalanine ammonia-lyase2.

Phenylalanine ammonia-lyase2.

Lactuca sativa (Garden lettuce).

Eukaryota; Viridiplantae; Streptophyta; Embryophyta; Tracheophyta;

Eukaryota; Viridiplantae; Streptophyta; eudicotyledons; core eudicots; aster.

Spermatophyta; Magnoliophyta; eudicotyledons; core eudicots; aster.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Lyase.
SEQUENCE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              SEQUENCE FROM N.A.
Campos Vargas R., Nonogaki H., Suslow T., Saltveit
Campos Vargas R., Nonogaki H., Suslow T., Saltveit
"Characterization of a second phenylalanine ammonia"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 01-MAR-2003
01-OCT-2003
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Q8GZR8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                15
   199
                                                                                                                                     141
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 599
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    616
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  515
                                                                                                                                                                                                       157
                                                                                                                                                                                                                                                                          88
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      40
                                                                                                                                                                                                                                                                                                                                             99
                                                                                                                                                                                                                                                                                                                                                                                                                   29
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Similarity
TITASGDLVPLSYTAGLLTGRANSKA-VGPTG--EVLNAEKAFAEAGVEGGFFELQPKEG
                                                              TISASGDLSPLSYIAAAITGHPDSKVHVXHEGXEKIMXAREAIALFGLEP--VVLGPKEG
                                                                                                                                 --FGNGTESTHTLPHSATRAAMLVRINTLLQGYSGIRFEILEAITKFLNHNVTPFLPLRG
                                                                                                                                                                                            FXLGRGLE--NSLPLEVVRGAMTIRVNSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRG
                                                                                                                                                                                                                                                                          AGVKASSDWVMESMNKGTDSYGVTTGFGATSHRRTXEGGALQXELIRFLNAGI-----
                                                                                                                                                                                                                                                                                                                                         XKIDKSVEFLRXQLXNSV--YGVTTGFGGSADTRTBDAISLQKALLEHQLCGVLFTSXDS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                   GSXLPTTXXTQLDIVEXXLADPXTDDXXELDGYSLTLGDVVG-AARKGRXVRVXDSDEIR
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    ISARRTAEANDVLSLLLATHLYCVLQAVDLRAMEFEFKXQFXPXXXXLLXQHFGXXXTXX
                                                                                                                                                                                                                                                                                                                                                                                                                       GMAAESLKGSHLDEVKRMVAE-FRKPVVRLGGETLTVSQVAAIAASDNAGVKVELSETAR
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       RVLYSFVREELGVKARRGDVFLGKQEVTIGSNVSRIYEAIKSGRINXVLVKML
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     VEXLSSXXXXXVSLAAVNAWKVAXABKAIS--LTRXVRXXFWXAPSSSSPALXYLSP-RT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               ISSRKTSEAVDILKLMSTTFLVGICQAVDLRHLEENLRQ---
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 VDHALSNGETEKNAVTSIFQKIGAFEEELKAVLPKEVEAARAAYGNGTAPIPNRIKECRS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   NTVSQVAKKVLTTGINGELHPSRFCEKDLLKVVDREQVFTYVDDPCSATYPLMQRLRQVI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             XXXXELXXKV----
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 713
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             3 (TrEMBLrel.
3 (TrEMBLrel.
3 (TrEMBLrel.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ΑA;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 77657 MW;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          27.9%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            106;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        - LLTGEKVVSPGEEFDKVFTAMCEGKLIDPLMDCL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Last sequence update)
Last annotation updat
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Score 939; DB 1
Pred. No. 2e-65;
6; Mismatches 2
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     -----xkxlxkrl--eqtnsydlep--rwhdafsxatgtv
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 87751A2ED7349E61 CRC64;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              À
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           ; IEA.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           10;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   IEA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ammonia-lyase
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            265;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 update)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    databases.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    3
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ħ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      (PAL)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            86,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   asterids;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            706
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   gene
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   IVX
                                                                                                                                                                                                                                                                                                                                                    156
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      574
                                                                      272
                                                                                                                                            198
                                                                                                                                                                                                                                                                              140
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             615
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         98
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    672
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          598
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     658
```

	CRSYPLYRFVREELGTGFLTGEEVTSPGEEFDKVFTALCKGHI 694	652	D)
	ALXYLSPRTRVLYSFVREELGVKARRGDVFLGKQEVTI-GSNVSRIYEAIKSGRI 717	664	γQ
651	AGTSIFQKISEFEBELKAVLFKEVEGVRSAYESSTLTIPNRIKE	608	Дb
663	WHDAFSXATGTVVEXLSSXXXXXVSLAAVNAWKVAXAEKAISLTRXVRXXFWXADSSSSD	604	γQ
607	VNGELHPSRFCEKDLLRVVDREYVFAYIDDACSATYPLMQKLRQVIVDHALNNEND	552	Дb
603	GXXXTXXXXXXELXXKVXKXLXKRLEQTNSYDLEPR	U 60 80	γQ
551	LGLISARKTAESVEILKLMSTTYLVALCQSIDLRHLE-ENLKSTVKNTVSLVAKKILTTG	493	Дb
567		512	γQ
492	DFYNNGLPSNLSGGRNPSLDYGFKGAETAMASYCSELQFLANPVTNHVQSAEQHNQDVNS	433	ďŒ
511		453	γQ
432	AAIGKLMFAQFSELVN	373	dd
452		393	δδ
372	IEAAAIMEYILDGSDY-VKAAQKVHEMDPLQKPKQDRYALRTSPQWLGPQI-EVIRSSTK 372	315	Db
392	IEVARNIRTLLEGSXFAVHHEEEVKVKDDEGILRQDRYPLRTSPQWLGPLVSDMIHAHAV	333	Ş
314	LALVNGTAVGSGMASMVLFDANVLALLSEVLSAIFAEVMQGKP-EFTDHLTHKLKHHPGQ	256	Дb
332	LGLVNGTAVSASMATLALHDAHMLSLLSQALTALTVEAMVGHAGSFHFFLHDVTRPHFTQ	273	γQ

Search completed: September 9, 2004, 10:07:45 Job time : 91.3651 secs

```
Title:
Perfect score:
Sequence:
                                                                                                                                                                                                                                                                                                                                                                                                                                           Database
                                                                                                                                                                                                                                                                                                                                                                                                                                                           Post-processing: Minimum Match 0%
Maximum Match 100%
Listing first 45 summaries
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Minimum DB
Maximum DB
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Scoring table:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Run on:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        OM protein -
                                                                                                                                                                                                                                                                           Result
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Total number of hits satisfying chosen parameters:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Searched:
                                                                                                                                                                                                                                                                   No.
  Pred. No. is the number of results predicted by chance to have a score greater than or equal to the score of the result being printed, and is derived by analysis of the total score distribution.
                                                                                                                                                                                                                                                                   Score
 3021
3021
3021
3021
3021
3019
3019
3019
3018
3018
3018
30115
30115
30114
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   seq length: 0
seq length: 2000000000
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     protein search, using sw model
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       US-09-939-408A-21
3365
1 MAPSLDSIATSXANGX:
                                                                                                                                                                                                                                                                                                                                                         A Geneseq_29Jan04:*
1: geneseqp1980s:*
2: geneseqp1990s:*
3: geneseqp2000s:*
4: geneseqp2001s:*
5: geneseqp2002s:*
6: geneseqp2003s:*
7: geneseqp2003bs:*
8: geneseqp2004s:*
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          BLOSUM62
Gapop 10.0 , Gapext 0.5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  September 9, 2004, 09:49:43; Search time 89.3693 Seconds (without alignments) 2295.302 Million cell updates/sec
                                                                                                                                                                                                                                                                   Query
Match Length DB
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1586107 segs, 282547505 residues
 MAPSIDSIATSXANGXXNGX......RIYEAIKSGRINXVLVKMLA 726
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     GenCore version 5.1.6
Copyright (c) 1993 - 2004 Compugen Ltd.
 ABB07694
AAR27942
AAP80513
AABB07693
AABE07693
AABE16389
AAG21668
AAG21668
AAG21666
AAG216660
AAG216660
AAG216660
AAG216660
AAG216660
AAG216660
AAG216660
AAG216660
AAG216660
AAG216660
AAG216660
AAG216660
AAG216660
AAG216660
AAG216660
AAG216660
AAG216660
AAG216660
AAG216660
AAG216660
AAG216660
AAG216660
AAG216660
AAG216660
AAG216660
                                                                                                                                                                                                                                                                   ij
                                                                                                                                                                                                                                                                                                 SUMMARIES
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1586107
                                                                                                                                                               Aae27941 Rhodotoru
Aae20653 Rhodotoru
Aae16389 Rhodotoru
Abg71948 R. glutin
Ade36054 Rhodospor
                                                                                                                                                                                                                  Abb07694 Rhodotoru
Aae27942 Phenylala
Aap80513 L-phenyla
Abb07693 R. torulo
                                                                                          Aae16390
Abg71955
Ade36056
Aap81099
Ade36076
                      Aap83141 (
Ade36074 |
Aae20663 |
Abg71954 |
Ade36068 |
Ade360667 |
Ade36060 |
                                                                                                                                                                                                                                                                     Description
                                                                                                                                                      Aae20668
                                                                                                                                             Aae20654
 Rhodospor
Sequence
Sequence
Sequence
Sequence
Rhodospor
Sequence
I Rhodospor
Rhodospor
Rhodospor
Rhodospor
Rhodospor
Rhodospor
Rhodospor
Rhodospor
Rhodospor
Rhodospor
Rhodospor
Rhodospor
Rhodospor
Rhodospor
Rhodospor
Rhodospor
Rhodospor
                                                                                                                                             R. glutin
Rhodotoru
                                                                                                                                                      Rhodospor
R. glutin
```

ΧX

Claim 10; Fig 2; 135pp; English.

ק ק ה ה ה ה ה ה ה ה ה ה ה ה ה ה ה ה ה ה	DR DR PT	X 22 \$	Y P A	Y PR	g p }	4 B X	\$ 8 \$		20 20 20 E	X	<b>1</b>	<b>3333</b>	z A S	RES ABE		
reating mammal having duman immunodeficiency vonfection.	PI; 2002-268973/31.  -PSDB; ABA95244.  henylalanine ammonia ly	PI Yoshida RK, Kootstra AB; XX	PA (PCBU-) PCBU SERVICES INC.	4-JUL-2000; 2000US-006246	4-JUL-2001; 2001WO-US0232	PD 31-JAN-2002.	XX PN WO200208402-A2.	ey isc-difference 1726 /note= "7 consensu	OS Rhodotorula graminis. OS Rhodotorula mucilaginosa. OS Rhodotorula mucilaginosa. OS Rhodosporidium toruloides.	AL; yeast; phenylalanine aytostatic; anti-HIV; viruo onsensus; enzyme.	hodotorula PAL consensus	DT 29-AUG-2003 (revised) DT 07-AUG-2003 (revised) DT 10-JUN-2002 (first entry)	AC ABB07694;	RESULT 1 ABB07694 ID ABB07694 standard; protein;		26 3012 89.5 716 5 27 3012 89.5 716 7 28 3012 89.5 716 7 29 3011 89.5 716 7 30 3010 89.5 716 5 31 3010 89.5 716 5 32 3010 89.5 716 6 33 3010 89.5 716 6 34 3010 89.5 716 6 36 3007 89.3 716 7 37 3006 89.3 716 7 38 3006 89.3 716 7 39 3006 89.3 716 7 41 3005 89.3 716 7 42 2978 89.3 716 7 43 2978 89.5 716 7 44 2978 88.5 716 5 45 2971 88.5 716 5
isease or disorder from phenylkeronuffa, candinus infection and human cytomegalovirus	polypeptide and polynucleotide useful i			93.	70.			'Qualifiers (aa is any amino acid; "Xaa" indicates no s at that position"		ammonia lyase; cinnamic acid; cinnamate; cide; nootropic; dermatological; gene therapy;	polypeptide sequence.			; 726 AA.	ALIGNMENTS	AAE20660 ABEG71951 ABG71951 ABG71951 ADE36062 ADE36066 ADE30662 ADE30666 ADE30666 ADE30666 ADE30666 ADE30666 ADE30661 ADE30661 ADE30661 ADE30661 ADE30661 ADE30661 ADE30661 ADE30661 ADE30661 ADE30661 ADE30661 ADE30661 ADE30664 ADE30669 ADE30664 ADE30664 ADE30664 ADE30664 ADE30668 ADE36070 ADE36072 ADE36072 ADE36072 ADE36072 ADE36072 ADE36073 ADE36073 ADE36064 ADE36068 ADE36068 ADE36072 ADE36068 ADE3608 ADE36068 ADE

```
Matches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Query Match
Best Local :
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 The invention relates to an isolated and purified yeast phenylalanine ammonia lyase (PAL) polypeptide. The PAL encoding polynucleotide or a host cell comprising the polynucleotide is useful for the production of L-PAL, by adding the polynucleotide or the host cell to a composition comprising trans-cinnamic acid, or trans-cinnamate and ammonia; and for improving the production of PAL, its analog or another optically active unnatural amino acid having PAL-like structure. The PAL polynucleotides are useful for treating a mammal having a disease, disorder or condition selected from phenylketomuria, cancer, human impunodeficiency virus infection and human cytomegalovirus infection. The present sequence represents a consensus polypeptide sequence of the Rhodotorula PAL. (Updated on 07-AUG-2003 to standardise OS field)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Sequence 726 AA;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           481
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       421
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          181 NSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAITGHPDSKV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           726;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     43
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                سر
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1 MAPSLDSIATSXANGXXNGXHAAXXASXXXXXXXXXAXAGSXLPTTXXXTQLDIVEXXLAD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Similarity
                                                     LVKMLA 726
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      HVXHEGXEKIMXAREAIALFGLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
LVKMLA 726
                                                                                                                    SSPALXYLSPRTRVLYSFVREELGVKARRGDVFLGKQEVTIGSNVSRIYEAIKSGRINXV
                                                                                                                                                      SSPALXYLSPRTRVLYSFVRBELGVKARRGDVFLGKQEVTIGSNVSRIYEAIKSGRINXV
                                                                                                                                                                                                                                                                 EPRWHDAFSXATGTVVEXLSSXXXXXVSLAAVNAWKVAXAEKAISLTRXVEXXFWXAFSS
                                                                                                                                                                                                                                                                                                                                                                                        AVDLRAMEFEFKKQFXPXXXXLLXQHFGXXXTXXXXXXELXXKVXKXLXKRLEQTNSYDL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            QASAVXNTMEKTRLALALIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          DEGILRQDRYPLRTSPQWLGPLVSDMIHAHAVLSLEAGQSTTDNPLIDVENKXTHHGGNF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          NSLTRGHSAVRLVVLEALINFLNHGITPIVPLRGTISASGDLSPLSYIAAAITGHPDSKV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             MAPSIDSIATSXANGXXNGXHAAXXASXXXXXXXXXXAXAGSXLPTTXXTQLDIVEXXLAD
                                                                                                                                                                                                                                                                                                                                                  AVDLRAMEFEFKKQFXPXXXXLLXQHFGXXXTXXXXXXELXXKVXKXLXKRLEQTNSYDL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                   AAAYTSELGHLANPVTTHVQPAEMGNQAVNSLALISARRTAEANDVLSLLLATHLYCVLQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           AMAYTSELGHLANPVTTHVQPAEMGNQAVNSLALISARRTAEANDVLSLLLATHLYCVLQ 540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       QASAVXNTMEKTRLALALIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     DEGILRQDRYPLRTSPQWLGPLVSDMIHAHAVLSLEAGQSTTDNPLIDVENKXTHHGGNF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         QALTALTVEAMVGHAGSFHPFLHDVTRPHPTQIEVARNIRTLLEGSXFAVHHEEEVKVKD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 QALTALTVEAMVGHAGSFHPFLHDVTRPHPTQIEVARNIRTLLEGSXFAVHHEEEVKVKD 360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          HVXHEGXEKIMXAREAIALFGLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        TGFGGSADTRTEDAISLQKALLEHQLCGVLPTSXDSFXLGRGLENSLPLEVVRGAMTIRV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    TGFGGSADTRTEDAISLQKALLEHQLCGVLPTSXDSFXLGRGLENSLPLEVVRGAMTIRV 180
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            PXTDDXXELDGYSLTLGDVVGAARKGRXVRVXDSDEIRXKIDKSVEFLRXQLXNSVYGVT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  PXTDDXXELDGYSLTLGDVVGAARKGRXVRVXDSDEIRXKIDKSVEFLRXQLXNSVYGVT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           95.8%; Score 3223; D
100.0%; Pred. No. 0;
tive 0; Mismatches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      DB 5; Length 726;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 0
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 0
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            . 480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           180
                                                                                                                                                                                                                                    660
                                                                                                                                                                                                                                                                                          660
                                                                                                                                                                                                                                                                                                                                                  600
                                                                                                                                                                                                                                                                                                                                                                                                           600
                                                                                                                                                                                                                                                                                                                                                                                                                                                                   540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 0
```

Ś В Ś B Ş

B

5

δ

181

뮍 8 밁 Š B Ş g Ş 뮹 Š 망 Š 밁 Ś 밁 Ś 망

```
Š
                                                                                          B
                                                                                                                       8
                                                                                                                                                         밁
                                                                                                                                                                                    Š
                                                                                                                                                                                                                                                                                   RESULT 2
AAE27942
                            당
                                                                                                                                                                                                                      Matches 726;
                                                                                                                                                                                                                                                                                                              The present invention relates to yeast (e.g. Rhodotorula) phenylalanine ammonia lyase (PAL; EC 4.3.1.5) proteins and polymucleotides encoding such proteins. PAL sequences are useful for producing L-phenylalanine. They are useful for treating mammals having diseases, disorders or conditions that would benefit from treatment with PAL proteins such as phenylketonuria, cancer, human immunodeficiency virus infection (HIV) or human cytomegalovirus (hCMV) infection. Sequences of the invention are also used in gene therapy. The present sequence is PAL consensus protein. (Updated on 06-AUG-2003 to correct OS field.)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Rhodotorula graminis.
Rhodotorula mucilaginosa
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Yeast; phenylalanine ammonia lyase; PAL; EC 4.3.1.5; phenylketonuria; cancer; human immunodeficiency virus infection; HIV; gene therapy; hCMV; human cytomegalovirus infection; cytostatic; virucide.
                                                                                                                                                                                                                                                                                   Sequence 726 AA;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Claim
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          polypeptide,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        WPI; 2002-690616/74.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Yoshida RK,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  24-JUL-2000;
24-JUL-2001;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  24-AUG-2001; 2001US-00939408
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Misc-difference 726. .719
/note= "Xaa corresponds to unknown amino acid residue"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Rhodosporidium
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Phenylalanine ammonia lyase consensus protein
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       06-AUG-2003
27-DEC-2002
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  AAE27942 standard; protein;
                                                                                                                                                                                                                                       Loca1
                                121
                                                             121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        isolated and purified Rhodotorula phenylalanine ammonia lyase eptide, useful for treating a mammal having phenylketonuria, cancer, immunodeficiency virus or human cytomegalovirus infection.
                                                                                           61
                                                                                                                        61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                           26; Page 47-48; 74pp; English.
                                                                                                                                                         Н
                                                                                                                                                                                     1 MAPSIDSIATSXANGXXNGXHAAXXASXXXXXXXXXXXAXAGSXIPTTXXTQIDIVEXXIAD
                                                                                                                                                                                                                                     Similarity
NSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAITGHPDSKV
                                                 TGFGGSADTRTEDAISLQKALLEHQLCGVLPTSXDSFXLGRGLENSLPLEVVRGAMTIRV
                                                                                           PXTDDXXELDGYSLTLGDVVGAARKGRXVRVXDSDETRXKIDKSVEFLRXQLXNSVYGVT
                                                                                                              PXTDDXXELDGYSLTLGDVVGAARKGRXVRVXDSDEIRXKIDKSVEFLRXQLXNSVYGVT
                              TGFGGSADTRTEDAISLQKALLEHQLCGVLPTSXDSFXLGRGLENSLPLEVVRGAMTIRV
                                                                                                                                                          MAPSIDSIATSXANGXXNGXHAAXXASXXXXXXXXXXAXAGSXLPTTXXTQLDIVEXXLAD
                                                                                                                                                                                                                      Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Kootstra AB;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  2000US-00624693.
2001WO-US023270.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       (revised)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       (first entry)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             toruloides.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Location/Qualifiers
                                                                                                                                                                                                                                   95.8%; Score 3223;
100.0%; Pred. No. 0;
                                                                                                                                                                                                                       0,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    726 AA
                                                                                                                                                                                                                       Mismatches
                                                                                                                                                                                                                                                    DB 5;
                                                                                                                                                                                                                       0
                                                                                                                                                                                                                                                    Length 726;
                                                                                                                                                                                                                       Indels
                                                                                                                                                                                                                       0
                                                                                                                                                                                                                       Gaps
                                  180
                                                                                               120
                                                                                                                                                          60
```

```
망
                                                                                                                                                                                                                                                                                                                                                                                                                  Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                         g
                                                                                                                                                                                                                                                                                                                                                                                                                                                             Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               g
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        멍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                맑
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                δÃ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     В
                    WPI; 1988-236895/34.
N-PSDB; AAN81116.
                                                                                                                                                      24-AUG-1988.
                                                                                                                                                                                             Rhodosporidium
                                                                                                                                                                                                                                                                                 25-MAR-2003
12-NOV-1990
                                                                                                                                                                                                                                                                                                                 AAP80513;
                                                                                                                                                                                                                                                                                                                                        AAP80513
                                                       Fukuhara N,
                                                                                                   19-FEB-1987;
18-JUN-1987;
                                                                                                                                   18-FEB-1988;
                                                                                                                                                                               EP279665-A.
                                                                                                                                                                                                                         L-phenylalanine ammonialyase; PAL; foreign gene culture temperature; expression regulation.
                                                                                                                                                                                                                                                           L-phenylalanine ammonialyase
                                                                            (MITK ) MITSUI TOATSU CHEM INC
                                                                                                                                                                                                                                                                                                                                                                                                                                                              199
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     601
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          601
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                541
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      541
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            481
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     181
                                                                                                                                                                                                                                                                                                                                                                                              721
                                                                                                                                                                                                                                                                                                                                                                                                                   721
                                                                                                                                                                                                                                                                                                                                                                                                                                          661
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 481
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        421
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             421
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     NSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAITGHDDSKV
                                                                                                                                                                                                                                                                                                                                                                                             LVKMLA 726
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       EPRWHDAFSXATGTVVEXLSSXXXXXVSLAAVNAWKVAXAEKAISLTRXVRXXFWXAPSS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       QASAVXNTMEKTRLALALIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 DEGILRQDRYPLRTSPQWLGPLVSDMIHAHAVLSLEAGQSTTDNPLIDVENKXTHHGGNF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             QALTALTVEAMVGHAGSFHPFLHDVTRPHPTQIEVARNIRTLLEGSXFAVHHEEEVKVKD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      HVXHEGXEKIMXAREAIALFGLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                                                                                                                                                                                                                                                                                                                                                                                                 LVKMLA 726
                                                                                                                                                                                                                                                                                                                                                                                                                                         SSPALKYLSPRIRVLYSFVREELGVKARRGDVFLGKQEVTIGSNVSRIYEAIKSGRINXV
                                                                                                                                                                                                                                                                                                                                                                                                                                                          SSPALXYLSPRTRVLYSFVREELGVKARRGDVFLGKQEVTIGSNVSRIYEAIKSGRINXV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     EPRWHDAFSXATGTVVEXLSSXXXXXVSLAAVNAWKVAXAEKAISLTRXVRXXFWXAPSS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   AVDLRAMBFBFKKQFXPXXXXXLLXQHFGXXXTXXXXXXXBLXXKVXKXLXKRLBQTNSYDL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              AAAYTSELGHLANPVTTHVQPAEMGNQAVNSLALISARRTAEANDVLSLLLATHLYCVLQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        QASAVXNTMEKTRLALALIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          HVXHEGXEKIMXAREAIALFGLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                                                                                                                                                                                                                                                                                                                      standard; protein; 716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  <u>AVDLRAMEFEFKKQFXPXXXXLLXQHFGXXXTXXXXXXELXXKVXKXLXKRLEQTNSYDL</u>
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            AAAYTSELGHLANPVTTHVQPAEMGNQAVNSLALISARRTAEANDVLSLLLATHLYCVLQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    DEGILRQDRYPLRTSPQWLGPLVSDMIHAHAVLSLEAGQSTTDNPLIDVENKXTHHGGNF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                QALTALTVEAMVGHAGSFHPFLHDVTRPHPTQIEVARNIRTLLEGSXFAVHHEEEVKVKD
                                                       Yoshino
                                                                                                                                                                                                                                                                                (revised)
(first entry)
                                                                                                   87JP-00034397.
87JP-00152359.
                                                                                                                                                                                                   toruloides.
                                                                                                                                   88EP-00301356
                                                       Ś
 of foreign gene in
                                                        Yamamoto
                                                        ×
                                                        Sone
                                                        Ś
 Escherichia coli
                                                       Suzuki
                                                        Z
                                                        Nakaj ima
                                                        К
                                                                                                                                                                                                                                                                                                                                                                                                                                           720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      600
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      660
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           660
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  600
```

Regulation of expression

γď

ABB07693

ABB07693 standard;

protein;

Ä

RESULT 4

```
멍
                                                                                                                        Ş
                                                                                                                                                                                    Ś
                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                     Š
                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                Ś
                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                               8
                                                                                                                                                                                                                                                                                                                                                                                                                 멂
                                                                                                                                                                                                                                                                                                                                                                                                                                             Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                               뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     δÃ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                FXSCOCOCCXSX
Ś
                                                            Š
                                                                                          뫄
                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Query Match
Best Local Simi
Matches 610;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            The PAL gene is expressed in E.coli carrying a recombinant plasmid. Expression is regulated by maintaining the temperature at at least 40 deg. C to suppress expression. Pal is produced in high concentrations. See also EP-279664: regualtion by sugar component as C source at 0.3% or more. (Updated on 25-MAR-2003 to correct PR field.) (Updated on 25-MAR-2003 to correct PR field.)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Sequence 716 AA;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     maintaining temp. of culture at 40 deg. C or more to suppress expression
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Claim 3; Page 15-19; 36pp; English
                                                                                                                                                                                                                            474
                                                                                                                                                                                                                                                          481
                                                                                                                                                                                                                                                                                          414
                                                                                                                                                                                                                                                                                                                                                                                      361
                                                                                                                                                                                                                                                                                                                                                                                                                                                  301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              174
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          121
                                                                                                594
                                                                                                                                601
                                                                                                                                                              534
                                                                                                                                                                                              541
                                                                                                                                                                                                                                                                                                                      421
                                                                                                                                                                                                                                                                                                                                                      354
                                                                                                                                                                                                                                                                                                                                                                                                                    294
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                234
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          114
     721
                                    651
                                                                 661
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        ហ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      щ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1 MAPSIDSIATSXANGXXNGXHAAXXASXXXXXXXXAXAGSXLPTTXXTQLDIVEXXLAD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Similarity
                                                                                                                          EPRWHDAFSXATGTVVEXLSSXXXXXXVSLAAVNAWKVAXAEKAISLTRXVRXXFWXAPSS
                                                                                                                                                                                                                                                AAAYTSELGHLANPVTTHVQPAEMGNQAVNSLALISARRTAEANDVLSLLLATHLYCVLQ
                                                                                                                                                                                                                                                                                                                                                                         DEGILRQDRYPLRTSPQWLGPLVSDMIHAHAVLSLEAGQSTTDNPLIDVENKXTHHGGNF
                                                                                                                                                                                                                                                                                                                                                                                                                                        QALTALTVEAMVGHAGSFHPFLHDVTRPHPTQIEVARNIRTLLEGSXFAVHHEEEVKVKD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                HVVHEGKEKILYAREAMALFNLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         HVXHEGXEKIMXAREAIALFGLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          NSLTRGHSAVRIVVLEALTNELNHGITPIVPLRGTISASGDLSPLSYIAAAITGHPDSKV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              TGFGGSADTRTEDAISLQKALLEHQLCGVLPTSXDSFXLGRGLENSLPLEVVRGAMTIRV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          P-TDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVT
                                                                                                                                                                                      AVDLRAMBFBFKKQFXPXXXXLLXQHFGXXXTXXXXXXBLXXKVXKXLXKRLEQTNSYDL
                                                                                                                                                                                                                                                                                                                        QASAVXNTMEKTRLALALIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIA
                                                                                                                                                                                                                                                                                                                                                                                                                    OSLTAMTVEAMVGHAGSFHPFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEVKVKD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              NSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAISGHPDSKV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            PXTDDXXELDGYSLTLGDVVGAARKGRXVRVXDSDEIRXKIDXGVEFLRXQLXNSVYGVT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      MAPSIDSISHSFANGVASAKQAVNGAS-----TNLAVAGSHLPTTQVTQVDIVEKMLAA
                                                                                                VPRWHDAFSFAAGTVVEVLSS---TSLSLAAVNAWKVAAAESAISLTRQVRETFWSAAST
                                                                                                                                                              AIDLRAIBFEFKKOFGPAIVSLIDQHFGSAMTGSNLRDELVEKVNKTLAKRLEQTNSYDL
                                                                                                                                                                                                                            AAAYTSELGHLANPVTTHVQPAEMANQAVNSLALISARRTTESNDVLSLLLATHLYCVLQ
                                                                                                                                                                                                                                                                                        QAAAVANTMEKTRIGIAQIGKINFTQITEMINAGMNRGIPSCLAAEDPSISYHCKGIDIA
                                                                                                                                                                                                                                                                                                                                                     DEGILRODRYPLRTSPOWLGPLVSDLIHAHAVLTIEAGQSTTDNPLIDVENKTSHHGGNF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          TGFGGSADTRTEDAISLQKALLEHOLCGVLPSSFDSFRLGRGLENSLPLEVVRGAMTIRV
     LVKMLA 726
                                                               SSPALXYLSPRTRVLYSFVREELGVKARRGDVFLGKQEVTIGSNVSRIYEAIKSGRINXV
                                   SSPALSYLSPRTQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 89.8%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  ) Score 3021; DB 1;
Pred. No. 4.5e-300;
25; Mismatches 81;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Length 716;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     10;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Gaps
                                                                                                                                                                                                                                                                                                                          480
                                                                                                                                                                                                                                                                                                                                                                                                                                                     360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              173
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            180
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          120
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        წ
4
                                                                    720
                                                                                                                                660
                                                                                                                                                                                                                                                                                            473
                                                                                                                                                                                                                                                                                                                                                          413
                                                                                                                                                                                                                                                                                                                                                                                        420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                233
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           113
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       60
                                        710
                                                                                                    650
                                                                                                                                                                593
                                                                                                                                                                                                600
                                                                                                                                                                                                                            533
                                                                                                                                                                                                                                                              540
                                                                                                                                                                                                                                                                                                                                                                                                                      353
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    293
```

```
S
                                                 밁
                                                                               8
                                                                                                              밁
                                                                                                                                    δ
                                                                                                                                                                 g
                                                                                                                                                                                            5
                                                                                                                                                                                                                        Дb
                                                                                                                                                                                                                                                       5
                                                                                                                                                                                                                                                                                                                                                    Matches
                                                                                                                                                                                                                                                                                                          Query Match
Best Local
                                                                                                                                                                                                                                                                                                                                                                           The invention relates to an isolated and purified yeast phenylalanine ammonia lyase (PAL) polypeptide. The PAL encoding polynucleotide or a host cell comprising the polynucleotide is useful for the production of L-PAL, by adding the polynucleotide or the host cell to a composition comprising trans-cinnamic acid, or trans-cinnamate and ammonia; and for improving the production of PAL, its analog or another optically active unnatural amino acid having PAL-like structure. The PAL polynucleotides are useful for treating a mammal having a disease, disorder or condition selected from phenylketonuria, cancer, human immunodeficiency virus infection and human cytomegalovirus infection. The present sequence represents a R. toruloides PAL polypeptide. (Updated on 07-AUG-2003 to correct OS field.)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Phenylalanine ammonia lyase polypeptide and polynucleotide useful treating mammal having disease or disorder from phenylketonuria, chuman immunodeficiency virus infection and human cytomegalovirus
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            PAL; yeast; phenylalanine ammonia lyase; cinnamic acid; enzyme; cytostatic; anti-HIV; virucide; nootropic; dermatological; gene therapy.
                                                                                                                                                                                                                                                                                                                                                  Sequence
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Example 3; Fig 1; 135pp; English
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                24-JUL-2000; 2000US-00624693
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            24-JUL-2001; 2001WO-US023270
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      WC200208402-A2
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Rhodosporidium toruloides.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     07-AUG-2003
10-JUN-2002
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         toruloides
                                                      174
                                                                                  181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             2002-268973/31.
DB; ABA95243.
234
                          241
                                                                                                              114
                                                                                                                                           121
                                                                                                                                                                                                                                                                                           610;
                                                                                                                                                                         55
                                                                                                                                                                                                     61
                                                                                                                                                                                                                                   -
                                                                                                                                                                                                                                                               Н
                                                                                                                                                                                                                                                                                                         Similarity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        RK,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    PCBU
                                                                                                                                                                                                                                                             MAPSIDSIATSXANGXXNGXHAAXXASXXXXXXXXXXAXAGSXIPTTXXTQIDIVEXXIAD
             HVXHEGXEKIMXAREAIALFGLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                                                       NSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAITGHPDSKV
                                                                                                               TGFGGSADTRTEDAISIQKALLEHQLCGVLPSSFDSFRLGRGLENSLPLEVVRGAMTIRV
                                                                                                                                     TGFGGSADTRTEDAISIQKALLEHQLCGVLPTSXDSFXLGRGLENSLPLEVVRGAMTIRV
                                                                                                                                                                           Þ
                                                                                                                                                                                               PXTDDXXELDGYSLTLGDVVGAARKGRXVRVXDSDEIRXKIDKSVEFLRXQLXNSVYGVT 120
                                                       NSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAISGHPDSKV
                                                                                                                                                                                                                                 MAPSLDSISHSFANGVASAKQAVNGAS-----TNLAVAGSHLPTTQVTQVDIVEKMLAA
                                                                                                                                                                                                                                                                                                                                                  716 AA;
                                                                                                                                                                         TDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVT
                                                                                                                                                                                                                                                                                           Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    (revised)
(first en
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Kootstra
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    SERVICES
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        PAL polypeptide
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     entry)
                                                                                                                                                                                                                                                                                                       89.8%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    INC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        AB;
                                                                                                                                                                                                                                                                                           25;
                                                                                                                                                                                                                                                                                         ; Score 3021; DI
; Pred. No. 4.5e.
25; Mismatches
                                                                                                                                                                                                                                                                                         DB 5;
1.5e-300;
nes 61;
                                                                                                                                                                                                                                                                                                                   Length
                                                                                                                                                                                                                                                                                           Indels
                                                                                                                                                                                                                                                                                                                   716;
                                                                                                                                                                                                                                                                                         10;
                                                                                                                                                                                                                                                                                         Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 cancer,
                        300
                                                      233
                                                                                240
                                                                                                                                           180
                                                                                                                                                                                                                                 54
                                                                                                                                                                                                                                                               60
```

```
721
                                                                             651
                                                                                                                   661
                                                                                                                                                           594
                                                                                                                                                                                                 601
                                                                                                                                                                                                                                         534
                                                                                                                                                                                                                                                                                                                     474
                                                                                                                                                                                                                                                                                                                                                                                                414
711
                                                                                                                                                                                                                                                                             541
                                                                                                                                                                                                                                                                                                                                                          481
                                                                                                                                                                                                                                                                                                                                                                                                                                        421
                                                                                                                                                                                                                                                                                                                                                                                                                                                                              354
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            294
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               301
                                     LVKMLA 726
                                                                                                                                                                                                                                                                                                                                                  AAAYTSELGHLANPVTTHVQPAEMGNQAVNSLALISARRTAEANDVLSLLLATHLYCVLQ
LLKMLA 716
                                                                             SSPALSYLSPRIQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNV
                                                                                                           SSPALXYLSPRTRVLYSFVREELGVKARRGDVFLGKQEVTIGSNVSRIYEAIKSGRINXV
                                                                                                                                                           VPRWHDAFSFAAGTVVEVLSS---TSLSLAAVNAWKVAAAESAISLTRQVRETFWSAAST
                                                                                                                                                                                                 EPRWHDAFSXATGTVVEXLSSXXXXXVSLAAVNAWKVAXAEKAISLTRXVRXXFWXAPSS
                                                                                                                                                                                                                                         AIDLRAIEFEFKKQFGPAIVSLIDQHFGSAMTGSNLRDELVEKVNKTLAKRLEQTNSYDL
                                                                                                                                                                                                                                                                               AVDLRAMEFEFKKQFXPXXXXLLXQHFGXXXTXXXXXXELXXKVXKXLXKRLEQTNSYDL
                                                                                                                                                                                                                                                                                                                                                                                                QAAAVANTMEKTRLGLAQIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIA
                                                                                                                                                                                                                                                                                                                                                                                                                              QASAVXNTMEKTRLALALIGKLNFTQLTEMINAGMNRGLPSCLAAEDPSLSYHCKGLDIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                            DEGILRQDRYPLRTSPQWLGPLVSDLIHAHAVLTIEAGQSTTONDLIDVENKTSHHGGNF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    DEGILRODRYPLRTSPOWLGPLVSDMIHAHAVLSLEAGOSTTDNPLIDVENKXTHHGGNF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   QALTALTVEAMVGHAGSFHPFLHDVTRPHPTQIEVARNIRTLLEGSXFAVHHEEEVKVKD
                                                                                                                                                                                                                                                                                                                     AAAYTSELGHLANPVTTHVQPAEMANQAVNSLALISARRTTESNDVLSLLLATHLYCVLQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            QSLTAMTVEAMVGHAGSFHPFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEVKVKD
                                                                                                                                                                                                                                                                                                                                                            540
                                                                                                                                                                                                                                                                                                                     533
                                                                                                                                                                                                                                                                                                                                                                                                    473
                                                                                                                                                                                                                                                                                                                                                                                                                                        480
                                                                               710
                                                                                                                   720
                                                                                                                                                           650
                                                                                                                                                                                                   660
                                                                                                                                                                                                                                         593
                                                                                                                                                                                                                                                                               600
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                413
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    420
```

Ś

밁 Ś B á 밁 S 밁 S

밁

뮹

δ

밁 Ş 밁 Ś

AAE27941 standard; protein; 716 B

AAE27941;

06-AUG-2003 27-DEC-2002 (revised) (first ent entry)

Rhodotorula toruloides PAL protein

RESULT 1
AAB22791
ID AAB22
XX AAB22
XX AAB22
XX AAB22
XX CHOd-A
DT 27-D
XX Yeas
XX Yeas
XX Canc
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Chod
XX Cho Yeast; phenylalanine ammonia lyase; PAL; EC 4.3.1.5; phenylketonuria; cancer; human immunodeficiency virus infection; HIV; gene therapy; hCMV; human cytomegalovirus infection; cytostatic; virucide.

Rhodosporidium toruloides.

US2002102712-A1

24-AUG-2001; 2001US-00939408

24-JUL-2000; 24-JUL-2001; 2000US-00624693. 2001WO-US023270.

PCBU SERVICES

Yoshida

RK,

Kootstra

₽B

N-PSDB; 2002-690616/74 DB; AAD45815.

Novel isolated and purified Rhodotorula phenylalanine ammonia lyase polypeptide, useful for treating a mammal having phenylketonuria, contains immunodeficiency virus or human cytomegalovirus infection. polypeptide, useful for treat human immunodeficiency virus cancer,

Example 3; Page 43-45; 74pp; English

o

```
RESULT 6
AAE20653
ID AAE2
XX
                                                                                                                                                  Ś
                                                                                                                                                                                               B
                                                                                                                                                                                                                            Ş
                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                            Ş
                                                                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                                                                      Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ď,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ď,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            ß
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      ពួនខ្លួនខ្លួនខ្លួន
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Query Match
Best Local S
Matches 610
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 The present invention relates to yeast (e.g. Rhodotorula) phenylalanine ammonia lyase (PAL; EC 4.3.1.5) proteins and polynucleotides encoding such proteins. PAL sequences are useful for producing L-phenylalanine. They are useful for treating mammals having diseases, disorders or conditions that would benefit from treatment with PAL proteins such as phenylketonuria, cancer, human immunodeficiency virus infection (HIV) on human cytomegalovirus (hCW) infection. Sequences of the invention are also used in gene therapy. The present sequence is R. toruloides PAL protein. (Updated on 06-AUG-2003 to correct OS field.)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Sequence
                                                                                                                   711
                                                                                                                                                        721
                                                                                                                                                                                                                                    661
                                                                                                                                                                                                                                                                         594
                                                                                                                                                                                                                                                                                                                601
                                                                                                                                                                                                                                                                                                                                                       534
                                                                                                                                                                                                                                                                                                                                                                                          541
                                                                                                                                                                                                                                                                                                                                                                                                                                 474
                                                                                                                                                                                                                                                                                                                                                                                                                                                                        481
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           414
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                421
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       354
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     294
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                234
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    ហ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            610;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Similarity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         HVVHEGKEKILYAREAMALFNLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                                                                                                                                                                                                                                                       VPRWHDAFSFAAGTVVEVLSS---TSLSLAAVNAWKVAAAESAISLTRQVRETFWSAAST
                                                                                                                                                                                                                                                                                                  EPRWHDAFSXATGTVVEXLSSXXXXXVSLAAVNAWKVAXAEKAISLTRXVRXXFWXAPSS
                                                                                                                                                                                                                                                                                                                                                                                      AAAYTSELGHLANPVTTHVQPAEMGNQAVNSLALISARRTAEANDVLSLLLATHLYCVLQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    DEGILRQDRYPLRTSPQWLGPLVSDMIHAHAVLSLEAGQSTTDNPLIDVENKXTHHGGNF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        QALTALTVEAWVGHAGSFHPFLHDVTRPHPTQIEVARNIRTLLEGSXFAVHHEEEVKVKD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          HVXHEGXEKIMXAREAIALFGLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        NSITEGHSAVELVVLEALTNFLNHGITPIVPLEGTISASGDLSPLSYIAAAISGHPDSKV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            NSLTRGHSAVRLVVLEALTNFLNHGITFIVPLRGTISASGDLSPLSYIAAAITGHPDSKV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        TGFGGSADTRTEDAISLQKALLEHQLCGVLPTSXDSFXLGRGLENSLPLEVVRGAMTIRV 180
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    PXTDDXXELDGYSLTLGDVVGAARKGRXVRVXDSDEIRXKIDKSVEFLRXQLXNSVYGVT
                                                                                                                     LLKMLA
                                                                                                                                                                                             SSPALSYLSPRTQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNV
                                                                                                                                                                                                                                  SSPALXYLSPRTRVLYSFVREELGVKARRGDVFLGKQEVTIGSNVSRIYEAIKSGRINXV
                                                                                                                                                                                                                                                                                                                                                   AIDLRAIEFEFKKQFGPAIVSLIDQHFGSAMTGSNLRDELVEKVNKTLAKRLEQTNSYDL
                                                                                                                                                                                                                                                                                                                                                                                                                             AAAYTSELGHLANPVTTHVQPAEMANQAVNSLALISARRTTESNDVLSLLLATHLYCVLQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       QAAAVANTMEKTRIGIAQIGKINFTQITEMINAGMNRGIPSCLAAEDPSISYHCKGIDIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            QASAVXNTMEKTRLALALIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   DEGILRODRYPLRTSPOWLGPLVSDLIHAHAVLTIEAGOSTTDNPLIDVENKTSHHGGNF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 QSLTAMTVEAMVGHAGSFHPFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEVKVKD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      TGFGGSADTRTEDAISLQKALLEHQLCGVLPSSFDSFRLGRGLENSLPLEVVRGAMTIRV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              P-TDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          MAPSIDS ISHSFANGVASAKQAVNGAS----TNLAVAGSHLPTTQVTQVDIVEKMLAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               MAPSIDSIATSXANGXXNGXHAAXXASXXXXXXXXXXXXAXAGSXLPTTXXTQLDIVEXXLAD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    716 AA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Conservative
                                                                                                                   716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      89.8%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Score 3021; DB 5;
Pred. No. 4.5e-300;
5; Mismatches 81;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Length 716;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        10,
```

533

540 473

650 660 593 600

Similarity

Indels

10;

Gaps

54

60

480

413 420 353 360 293 300

AAE20653

standard;

protein;

밁 Ś 片 Š B 8

121

TGFGGSADTRTEDAISLQKALLEHQLCGVLPTSXDSFXLGRGLENSLPLEVVRGAMTIRV

TGFGGSADTRTEDAISLOKALLEHOLCGVLPSSFDSFRLGRGLENSLPLEVVRGAMTIRV

P-TDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVT PXTDDXXELDGYSLTLGDVVGAARKGRXVRVXDSDEIRXKIDKSVEFLRXQLXNSVYGVT MAPSIDSISHSFANGVASAKQAVNGAS-----TNLAVAGSHLPTTQVTQVDIVEKMLAA MAPSIDSIATSXANGXXNGXHAAXXASXXXXXXXXXXAXAGSXIPTTXXTQIDIVEXXIAD

113

ហ

```
The invention relates to methods for biological production of paraccic hydroxycinnamic acid (PHCA). The invention relates to developing of a new CC biocatalyst for conversion of glucose to PHCA by incorporation of the CC wild type phenylalanine ammonia lyase (PAL; EC 4.3.1.5) from the yeast CC Rhodotorula glutinis into Escherichia coli underlying the ability of the CC wildtype PAL to convert tyrosine to PHCA. The invention is also directed CC to developing a new biocatalyst for conversion of glucose to PHCA by CC incorporation of the wildtype PAL which possesses enhanced tyrosine CC ammonia lyase (PAL) activity from the yeast Rhodotorula glutinis plus the CP lant cytochrome p-450 and the cytochrome p-450 reductase into E. coli.

CC Nucleic acid encoding mutant TAL enzyme is useful for producing PHCA by recombinant techniques. The recombinantly produced PHCA may be used as a monomer for production of liquid crystal polymers (LCP). LCP may be used in electronic connectors and telecommunication and aerospace applications. LCP resistance to sterilising radiation has also enabled these materials to be used in medical sequence is Rhodotorula glutinis CP PAL protein
               Query Match
Best Local S
Matches 610
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Novel nucleic acid encoding truncated mutant tyrosine ammonia lyase (TAL) polypeptide, or mutant TAL polypeptide, useful for producing parahydroxycinnamic acid in recombinant host cell lacking cinnamate
                                                                                    Sequence
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                27-JUL-2000; 2000US-00627216
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        07-FEB-2002.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Rhodotorula glutinis.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Para-hydroxycinnamic acid; PHCA; food packaging; electronic coppenylalanine ammonia lyase; PAL; glucose; tyrosine ammonia lyase; PAL; glucose; tyrosine ammonia lyacytochrome p-450; cytochrome p-450; ordotrotase; liquid crystal portion; medical device; aerospace application;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   23-JAN-2001; 2001WO-US002099
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Rhodotorula glutinis phenylalanine ammonia lyase
Local c
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              OUPO ) DU
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     2002-280635/32.
)B; AAD33075.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         AA,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                        6; Page 92-95; 139pp;
                                                                                    716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            PONT DE NEMOURS & CO
                                                                                    AA,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Sariaslani FS,
             89.8%; Score 3021; DB 5;
84.0%; Pred. No. 4.5e-300;
tive 25; Mismatches 81;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Tang
                                                                                                                                                                                                                                                                                                                                                                                                                                                                        English.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ħ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         p.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         WW.
                                              Length 716;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          (PAL)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 polymer;
```

240

ა 4

```
RESULT 7
AAE16389
ID AAE1
XX AAE1
XX O9-A
DT O9-A
DT O9-A
XX Phen
KW Para
KW Para
KW Para
KW Eiqu
XX Rhod
XX Rhod
XX Rhod
XX O5-P
XX O5-P
XX O5-P
XX O5-P
XX O5-P
XX O5-P
XX WPI;
DR N-PE
                                                                                                                                                                   Phenylalanine ammonia-lyase; PAL; enzyme; cinnamate; food packing; PHCA para-hydroxycinnamic.acid; tyrosine ammonia-lyase; TAL; medical device; Liquid Crystal Polymer; LCP; electronic connector; telecommunication; aerospace application; chemical; red yeast.
                                    Tang
                                                                                                                                                   Rhodotorula glutinis
                                                                                                                                                                                                                   Rhodotorula glutinis wildtype
                                                                                                                                                                                                                                       09-APR-2002
                                                                                                                                                                                                                                                                           AAE16389
           WPI; 2002-121549/16
N-PSDB; AAD26923.
                                                                                            03-AUG-2000;
                                                                                                               15-FEB-2001
                                     ×
                                                                                                                                                                                                                                                                                                                                        721
                                                                                                                                                                                                                                                                                                                                                              651
                                                                                                                                                                                                                                                                                                                                                                                661
                                                                                                                                                                                                                                                                                                                                                                                                   594
                                                                                                                                                                                                                                                                                                                                                                                                                     601
                                                                                                                                                                                                                                                                                                                                                                                                                                       534
                                                                                                                                                                                                                                                                                                                                                                                                                                                          541
                                                                                                                                                                                                                                                                                                                                                                                                                                                                             474
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               481
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  414
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    421
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       354
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           294
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                234
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     174
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        181
                                                        BG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    NSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAITGHPDSKV
                                      Vannelli TM,
                                                                                                                                                                                                                                                                                                                                                              SSPALSYLSPRTQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNV
                                                                                                                                                                                                                                                                                                                                                                         VPRWHDAFSFAAGTVVEVLSS---TSLSLAAVNAWKVAAAESAISLTRQVRETFWSAAST
                                                                                                                                                                                                                                                                                                                                                                                                             EPRWHDAFSXATGTVVEXLSSXXXXXVSLAAVNAWKVAXAEKAISLTRXVRXXFWXAPSS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               QASAVXNTMEKTRLALALIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       DEGILRODRYPLRTSPOWLGPLVSDLIHAHAVLTIEAGOSTTDNPLIDVENKTSHHGGNF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 DEGILRODRYPLRTSPQWLGPLVSDMIHAHAVLSLEAGQSTTDNPLIDVENKXTHHGGNF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       HVVHEGKEKILYAREAMALFNLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          HVXHEGXEKIMXAREAIALFGLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                                                                                                                                                                                                                                                           standard;
                                                                                                                                                                                                                                                                                                                                             LVKMLA
                                                                                                                                                                                                                                                                                                                                                                                                                                                         AAAYTSELGHLANPVTTHVQPAEMANQAVNSLALISARRTTESNDVLSLLLATHLYCVLQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       AAAYTSELGHLANPVTTHVQPAEMGNQAVNSLALISARRTAEANDVLSLLLATHLYCVLQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  QAAAVANTMEKTRIGIAQIGKINFTQITEMINAGMNRGIPSCIAAEDPSISYHCKGIDIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           QSLTAMTVEAMVGHAGSFHPFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEVKVKD
                                                                                                                                                                                                                                                                                                                                                                                                                                        AIDLRAIEFEFKKOFGPAIVSLIDOHFGSAMTGSNLRDELVEKVNKTLAKRLEOTNSYDL
                                                        PONT
                                                                                             2000WO-US021156
                                                                                                                                                                                                                                      (first entry
                                                                          99US-0147719P
                                                                                                                                                                                                                                                                                                                                            726
                                                        DE NEMOURS & CO
                                                                                                                                                                                                                                                                                                                          716
                                                                                                                                                                                                                                                                           protein;
                                      <u>۾</u>
                                      Ä,
                                                                                                                                                                                                                                                                             716
                                                                                                                                                                                                                    phenylalanine ammonia-lyase (PAL)
                                       Sariaslani
                                                         Ħ
                                                         H
                                      Ś
                                        Gatemby
                                                                                                                                                                                                                                                                                                                                                                 710
                                                                                                                                                                                                                                                                                                                                                                                                     650
                                                                                                                                                                                                                                                                                                                                                                                                                      660
                                                                                                                                                                                                                                                                                                                                                                                                                                         593
                                                                                                                                                                                                                                                                                                                                                                                                                                                           600
                                                                                                                                                                                                                                                                                                                                                                                                                                                                             533
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    473
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        413
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            353
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 293
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      233
                                                                                                                                                                                                                                                                                                                                                                                  720
                                                                                                                                                                                                                                                                                                                                                                                 맑
                                                                                                                                                                                                                                                                                                                                                                                                                                       Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ś
                                                                                                                                                                                                                                           Ś
                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                    S
                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                        Ş
                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                            Ş
                                                                                                                                                                                                                                                                                                                                                                                                   Ś
                                                                                                                                                                                                                                                                                                                                                                                                                      B
                Ş
                                       밁
                                                   Ş
                                                                      뫄
                                                                                         δ
                                                                                                                 밁
                                                                                                                             8
                                                                                                                                                    뮍
                                                                                                                                                                    Ś
                                                                                                                                                                                    밁
                                                                                                                                                                                                                              B
```

유 성

음 성 음 성

Producing para-hydroxycinnamic acid for producing liquid crystal polymer, comprises converting cinnamate to PHCA, glucose to PHCA by phenyl ammonia-lyase route, or generating a biocatalyst with tyrosine ammonia-lyase activity.

Claim 8; Page 65-67; 75pp; English

The invention relates to a method for producing para-hydroxycinnamic acid (PHCA). The method comprises converting cinnamate to PHCA by converting glucose to phenylalanine to PHCA through the phenyl ammonia-lyase (PAL) route or by generating a new biocatalyst possessing enhanced tyrosine ammonia-lyase (TAL) activity. The method is useful for the biological production of PHCA which is useful as a monomer for the production of Liquid Crystal Polymers (LCP), where the LCP is used in electronic connectors, telecommunications and aerospace applications. LCP is also useful in medical devices, as well as chemical, and food packing applications due to its resistance to sterilising radiation. The present sequence is red yeast, Rhodotorula glutinis (Rhodosporidium toruloides) wildtype PAL

Sequence 716 A

8

유 성

유영

당 양 당

S ďΩ δõ B

Matches Query Match Best Local 534 541 474 481 414 421 354 361 294 301 234 241 174 181 114 661 594 601 121 610; ហ 61 -1 MAPSIDSIATSXANGXXNGXHAAXXASXXXXXXXXAXAGSXLPTTXXTQLDIVEXXLAD Similarity P-TDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVT PXTDDXXELDGYSLTLGDVVGAARKGRXVRVXDSDEIRXKIDKSVEFLRXQLXNSVYGVT MAPSIDSISHSFANGVASAKQAVNGAS-----TNLAVAGSHLPTTQVTQVDIVEKMLAA AAAYTSELGHLANDVTTHVQPAEMGNQAVNSLALISARRTAEANDVLSLLLATHLYCVLQ QASAVXNTMEKTRLALALIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIA DEGILRQDRYPLRTSPQWLGPLVSDLIHAHAVLTIEAGQSTTDNPLIDVENKTSHHGGNF DEGILRODRYPLRTSPOWLGPLVSDMIHAHAVLSLEAGOSTTDNPLIDVENKXTHHGGNF HVXHBGXEKIMXAREAIALFGLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS NSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAISGHPDSKV NSLTRGHSAVRLVVLEALTNEINHGITBIVDLRGTISASGDLSPLSYIAAAITGHDDSKV SSPALXYLSPRTRVLYSFVREELGVKAARGDVFLGKQEVTIGSNVSRIYEAIKSGRINXV EPRWHDAFSXATGTVVEXLSSXXXXXVSLAAVNAWKVAXAEKAISLTRXVRXXFWXAFSS AVDLRAMEREFKKQFXPXXXXLLXQHFGXXXTXXXXXXELXXKVXKXLXKRLEQTNSYDL AAAYTSELGHLANPVTTHVQPAEMANQAVNSLALISARRTTESNDVLSLLLATHLYCVLQ QSLTAMTVEAMVCHAGS FHOF LHDVTRPHOTQ I EVAGNIRKLLEGSRFAVHHEEEVKVKD VPRWHDAFSFAAGTVVEVLSS---TSLSLAAVNAWKVAAAESAISLTRQVRETFWSAAST AIDLRAIEFEFKKOFGPAIVSLIDOHFGSAMTGSNLRDELVEKVNKTLAKRLEOTNSYDL Conservative 89.8%; 25; Score 3021; DB 5; Pred. No. 4.5e-300; 5; Mismatches 81; Length Indels 10; Gaps 300 180 113 120 54 60 600 473 480 420 293 233 240 173 650 660 533 540 353

651

SSPALSYLSPRIQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNV

```
RESULT 8
ABG71948
ID ABG7
                                                                                                                                                                                                                 XAXEXEXXEXXEXXEXEXEXEXEXEXEXXEXOOOOOO
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ş
밁
                      5
                                                                문
                                                                                                     Ś
                                                                                                                                                                                                                                            The invention relates to a recombinant host comprising at least one gene cencoding a tyrosine ammonium lyase (TAL) activity, and at least one gene encoding a phenylalanine hydroxylase (PAH) activity. Also included are: (1) a method for producing para-hydroxycinnamic acid involving; (1) providing the recombinant host; and (2) growing the recombinant organism in the presence of a fermentable carbon substrate and thus producing para-hydroxycinnamic acid; (2) method for producing tyrosine involving; (1) providing a recombinant organism comprising at least one gene encoding a phenylalanine hydroxylase activity; and (2) growing the recombinant organism in the presence of a fermentable carbon substrate to produce tyrosine. The recombinant host cell is used for producing para-hydroxycinnamic acid and tyrosine. Increasing the carbon flow into the production of para-hydroxycinnamic acid (PHCA) which is useful as a monomer for the production of fliquid crystal polymer. The present sequence is R. glutinis wild-type Phenylalanine ammonia-lyase, PAL, an cryme which catalyses the conversion of phenylalanine into cinnamic acid
                                                                                                                                         Query Match
Best Local S
Matches 610
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Qi WW,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Enzyme; phenylalanine ammonia-lyase; PAL; phenylalanine hydroxylase; PAH; para-hydroxycinnamic acid; tyrosine ammonium lyase; TAL; tyrosine; cinnamic acid; PHCA; liquid crystal polymer.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              ABG71948 standard; protein; 716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Claim 5;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Novel recombinant host for producing para-hydroxycinnamic acid and tyrosine, comprises gene encoding tyrosine ammonium lyase activity gene encoding phenylalanine hydroxylase activity.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        N-PSDB;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  04-MAY-2001; 2001US-0288701P
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      03-MAY-2002; 2002WO-US018551
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        14-NOV-2002
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          WO200290523-A2
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Rhodtorula glutinis.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      R. glutinis wild-type Phenylalanine ammonia-lyase,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          27-JAN-2003 (first entry)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              ABG71948;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               (DUPO ) DU PONT DE NEMOURS & CO
                                                                                                                                                                                                                 Sequence 716 AA;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           2003-058928/05
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      711
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        721
                                                                                                                                             610;
                                61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Sariaslani FS,
                                                                                                                                                              Similarity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |:|||
|LLKMLA 716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        LVKMLA 726
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Page 48-50; 69pp;
                                PXTDDXXELDGYSLTLGDVVGAARKGRXVRVXDSDEIRXKIDKSVEFLRXQLXNSVYGVT 120
                                                                      MAPSIDSISHSFANGVASAKQAVNGAS-----TNLAVAGSHIPTTQVTQVDIVEKMLAA
                                                                                                      MAPSIDSIATSXANGXXNGXHAAXXAXXXXXXXXXAXAGSXLPTTXXTQLDIVEXXLAD
P-TDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVXGVT
                                                                                                                                             Conservative
                                                                                                                                                            89.8%; Score 3021; DB 6; Length 716; B4.0%; Pred. No. 4.5e-300;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Tang X;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             English.
                                                                                                                                             25;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               M
                                                                                                                                             Mismatches
                                                                                                                                              81;
                                                                                                                                              Indels
                                                                                                                                             10;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      and
                                                                        54
                                                                                                            60
```

```
RESULT 9
ADE36054
ID ADE3
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         S
밁
                                                                                                                                                                                                                                                                                                                                                                                          Š
                                                                                                                                                                                                                                                                                                                                                                                                                     Ď,
                                                                                                                                                                                                                                                                                                                                                                                                                                         8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                       recombination; nucleic acid template; recombined polypeptide; altered property; combined gene.
                                                                                                                                                                                                                          Rhodosporidium glutinis PAL protein SEQ ID NO:2.
                                                                                                                                                                                                                                                        29-JAN-2004
                                                                                                                                                                                                                                                                                ADE36054;
                                                                                                               04-SEP-2003.
                                                                                                                                      WO2003072743-A2
                                                                                                                                                                                                                                                                                                        ADE36054 standard; protein;
            Milano
                                                                                      26-FEB-2003; 2003WO-US005708
                                                            26-FEB-2002; 2002US-0360279P
                                    (DUPO ) DU PONT DE NEMOURS & CO
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  234
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   174
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            474
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   481
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             414
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     421
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             354
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               294
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          121
                                                                                                                                                                                                                                                                                                                                                                      711
                                                                                                                                                                                                                                                                                                                                                                                             721
                                                                                                                                                                                                                                                                                                                                                                                                                        651
                                                                                                                                                                                                                                                                                                                                                                                                                                               661
                                                                                                                                                                                                                                                                                                                                                                                                                                                                        594
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  601
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          534
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   541
          'n,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               EPRWHDAFSXATGTVVEXLSSXXXXXVSLAAVNAWKVAXAEKAISLTRXVRXXFWXAPSS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          AIDLRAIEFEFKKQFGPAIVSLIDQHFGSAMTGSNLRDELVEKVNKTLAKRLEQTNSYDL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            AAAYTSELGHLANPVTTHVQPAEMGNQAVNSLALISARRTABANDVLSLLLATHLYCVLQ 540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               DEGILRQDRYPLRIGPQWLGPLVSDMIHAHAVLSLEAGQSITDNPLIDVENKXTHHGGNF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               QALTALTVEAMVGHAGSFHPFLHDVTRPHPTQIEVARNIRTLLEGSXFAVHHEBEVKVXD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 HVVHEGKEKILYAREAMALFNLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       HVXHEGXEKINXAREAIALFGLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   NSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAITGHPDSKV
                                                                                                                                                                                                                                                                                                                                                                                                                                                SSPALXYLSPRTRVLYSFVREELGVKARRGDVFLGKQEVTIGSNVSRIYEAIKSGRINXV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                        VPRWHDAFSFAAGTVVEVLSS---TSLSLAAVNAWKVAAAESAISLTRQVRETFWSAAST
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           AVDLRAMEFEFKKQFXPXXXXLLXQHFGXXXTXXXXXXELXXKVXKXLXXKRLEQTNSYDL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      QASAVXNTMEKTRIALALIGKINFTQLTEMINAGMNRGLPSCLAAEDPSLSYHCKGLDIA 480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               DEGILRODRYPLRTSPOWLGPLVSDLIHAHAVLTIEAGOSTTDNPLIDVENKTSHHGGNF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                QSLTAMTVEAMVGHAGSFHPFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEVKVKD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   NSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAISGHPDSKV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   TGFGGSADTRTEDAISIQKALLEHQLCGVLPSSFDSFRLGRGLENSLPLEVVRGAMTIRV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                TGFGGSADTRTEDAISLQKALLEHQLCGVLPTSXDSFXLGRGLENSLPLEVVRGAMTIRV
                                                                                                                                                                                                                                                                                                                                                                                              LVKMLA 726
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            AAAYTSELGHLANPVTTHVQPAEMANQAVNSLALISARRTTESNDVLSLLLATHLYCVLQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           QAAAVANTMEKTRIGIAQIGKINFTQITEMINAGMNRGIPSCLAAEDPSISYHCKGIDIA 473
                                                                                                                                                                                                                                                                                                                                                                                                                       SSPALSYLSPRTQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNV
                                                                                                                                                                                                                                                                                                                                                                      LLKMLA
         Tang
                                                                                                                                                                                                                                                        (first entry)
                                                                                                                                                                                                                                                                                                                                                                       716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              180
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     660
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              533
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   413
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   353
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     293
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      233
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              240
                                                                                                                                                                                                                                                                                                                                                                                                                            710
                                                                                                                                                                                                                                                                                                                                                                                                                                                                             650
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             593
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     600
```

2003-721766/68

ADE36053

```
밁
                                                                                                   Ş
                                                                                                                                       Ъ
                                                                                                                                                                                 Ş
                                                                                                                                                                                                                                뮍
                                                                                                                                                                                                                                                               8
                                                                                                                                                                                                                                                                                                         B
                                                                                                                                                                                                                                                                                                                                                        Ś
                                                                                                                                                                                                                                                                                                                                                                                                       밁
                                                                                                                                                                                                                                                                                                                                                                                                                                      5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       맑
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            The present invention describes a method for the recombination of nucleic CC acid (NA) templates. The method comprises: (a) providing at least two CC double-stranded templates (T1, T2) having different 5 and 3 regions in their sense strands; (b) contacting the templates with at least one each CC region of the antisense strand of T1 and to the 3 region of the sense strands; (b) contacting the templates with at least one each CC region of the antisense strand of T1 and to the 3 region of the sense CC (nt); (d) separating extended primers from their templates; (e) CC reannealing the extended primers from their templates; (e) CC reannealing the extended primers, to either template; and (f) repeating CC cycles of steps (b) (e) until at least one full-length extension product, CC i.e. a recombination of T1 and T2, is obtained. Also described: (1) a CC method starting from at least one each of antisense and sense single-cc stranded templates; (2) generating a recombined polypeptide (1) with CC altered properries by expressing recombination products of the new CC produced by method (2). The methods are useful for the recombination of mucleotiate acid templates of interest, and generation of a recombined CC polypeptide having altered properties. The method can be used to make CC combined genes that express proteins e.g. enzymes, cytokines, growth cCC e.g. stability, activity or specificity. The present sequence is used in the complete of the templater of the sequence is used in the complete of the complete of the complete of the complete of the complete of the complete of the complete of the complete of the complete of the complete of the complete of the complete of the complete of the complete of the complete of the complete of the complete of the complete of the complete of the complete of the complete of the complete of the complete of the complete of the complete of the complete of the complete of the complete of the complete of the complete of the complete of the complete of the complete of the complete of the comp
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Query Match
Best Local S
Matches 610
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Sequence
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            enzymes with
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   exemplification of the present invention
                          481
                                                                  414
                                                                                                          421
                                                                                                                                                  354
                                                                                                                                                                                          361
                                                                                                                                                                                                                                    294
                                                                                                                                                                                                                                                                                                                       234
                                                                                                                                                                                                                                                                            301
                                                                                                                                                                                                                                                                                                                                                            241
                                                                                                                                                                                                                                                                                                                                                                                                       174
                                                                                                                                                                                                                                                                                                                                                                                                                                               181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         114
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             610;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         55
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 13
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   μ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Similarity
AAAYTSELGHLANPYTTHYQPAEMGNQAVNSLALISARRTAEANDVLSLLLATHLYCVLQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  716
                                                                                        QASAVXNTMEKTRLALALIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIA
                                                                                                                                                DEGILRODRYPLRTSPOWLGPLVSDLIHAHAVLTIEAGQSTTDNPLIDVENKTSHHGGNF
                                                                                                                                                                                 DEGILRQDRYPLRTSPQWLGPLVSDMIHAHAVLSLEAGQSTTDNPLIDVENKXTHHGGNF
                                                                                                                                                                                                                                QSLTAMTVEAMVGHAGSFHPFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEVKVKD
                                                                                                                                                                                                                                                                        QALTALTVEAMVGHAGSFHPFLHDVTRPHPTQIEVARNIRTLLEGSXFAVHHEEEVKVKD
                                                                                                                                                                                                                                                                                                                  HVVHEGKEKILYAREAMALFNLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                                                                                                                                                                                                                                                                                                                             HVXHEGXEKIMXAREAIALFGLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                                                                                                                                                                                                                                                                                                                                                                                    NSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAISGHPDSKV
                                                                                                                                                                                                                                                                                                                                                                                                                                 NSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAITGHPDSKV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 TGFGGSADTRTEDAISLQKALLEHQLCGVLPTSXDSFXLGRGLENSLPLEVVRGAMTIRV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               PXTDDXXELDGYSLTLGDVVGAARKGRXVRVXDSDEIRXKIDKSVEFLRXQLXNSVYGVT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 MAPSIDSIATSXANGXXNGXHAAXXASXXXXXXXXXXAXAGSXIPTTXXTQLDIVEXXLAD
                                                                QAAAVANTMEKTRIGLAQIGKINFTQITEMINAGMNRGIPSCLAAEDPSISYHCKGIDIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       TGFGGSADTRTEDAISLQKALLEHQLCGVLPSSFDSFRLGRGLENSLPLEVVRGAMTIRV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       P-TDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       MAPSIDSISHSFANGVASAKQAVNGAS-----TNLAVAGSHLPTTQVTQVDIVEKMLAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              SEQ ID
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               A
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          n of nucleic
altered prop
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              ŏ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               89.8%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        leic acid templates, uproperties, is based
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            2; 481pp;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Score 3021; DB 7;
Pred. No. 4.5e-300;
5; Mismatches 81;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            English.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        useful e.g.
d on cyclic
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           8⊥:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      . for producing extension of un
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 716;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           10;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Gaps
                                                                                                        480
                                                                                                                                                                                          420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            180
                                                                                                                                                                                                                                353
                                                                                                                                                                                                                                                                        360
                                                                                                                                                                                                                                                                                                                293
                                                                                                                                                                                                                                                                                                                                                            300
                                                                                                                                                                                                                                                                                                                                                                                                  233
                                                                                                                                                                                                                                                                                                                                                                                                                                            240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       173
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       113
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               120
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       54
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 60
```

```
RESULT 10
AABZO668
ID AABZO
XX AABZO
XX AABZO
XX DATA
DT 01-JU
DE R. 91
XX Para-
KW Pheny
KW Cytoc
KW LCP;
KW LCP;
KW LCP;
KW Dioca
XX
Rhodo
OS Synth
XX
Key
PT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
FT Misc-
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          γŞ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    맑
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                      Novel nucleic acid encoding truncated mutant tyrosine ammonia lyase polypeptide, or mutant TAL polypeptide, useful for producing parahydroxycinnamic acid in recombinant host cell lacking cinnamate
                                                                                                                                                                                                                                                                                                    hydroxylase.
                                                                                                                                                                                                                                                                                                                                                                                                                                 N-PSDB;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        27-JUL-2000; 2000US-00627216
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        23-JAN-2001; 2001WO-US002099
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Rhodotorula
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Para-hydroxycinnamic acid; PHCA; food packaging; electronic connector; phenylalanine ammonia lyase; PAL; glucose; tyrosine ammonia lyase; TAL; cytochrome p-450; cytochrome p-450 reductase; liquid crystal polymer; cytochrome p-450; cytochrome p-450 reductase; liquid crystal polymer;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      R. glutinis
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             WO200210407-A1
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Misc-difference
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Synthetic
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        01-JUL-2002
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           AAE20668
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           AAE20668;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CP; telecommunication; medical device;
                                                                                                                                                                                                                                                                                                                                                                                                                              2002-280635/32.
DB; AAD33100.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  711
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  721
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     651
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    594
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         534
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  661
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       601
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         474
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ä
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ы
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        standard; protein; 716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  LLKMLA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          SPALSYLSPRTQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  LVKMLA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             SSPALXYLSPRTRVLYSFVREELGVKARRGDVFLGKQEVTIGSNVSRIYEAIKSGRINXV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    VPRWHDAFSFAAGTVVE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 AIDLRAIEFEFKKQFGPAIVSLIDQHFGSAMTGSNLRDELVEKVNKTLAKRLEQTNSYDL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      AVDLRAMEFEFKKQFXPXXXXLLXQHFGXXXTXXXXXXELXXKVXKXLXKRLEQTNSYDL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 EPRWHDAFSXATGTVVEXLSSXXXXXVSLAAVNAWKVAXAEKAISLTRXVRXXFWXAPSS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    AAAYTSELGHLANPVTTHVQPAEMANQAVNSLALISARRTTESNDVLSLLLATHLYCVLQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   PONT DE NEMOURS & CO
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 glutinis.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      phenylalanine
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 mutant; variant; mutein.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        (first
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Location/Qualifiers 540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  726
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          note= "Wild-type Ile
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        entry)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      ES.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ammonia lyase
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Tang
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     tri
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        A
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ×
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     H
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   <u>۾</u>
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          substituted with
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            aerospace
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      (PAL)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      χ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      mutant,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            application;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      EP18Km
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            enzyme;
                                                                                                                                                                                                                                                                                                                                                                           (TAL)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    650
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 660
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    593
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      600
```

The invention relates to methods for biological production of parahydroxycinnamic acid (PHCA). The invention relates to developing of a new biocatalyst for conversion of glucose to PHCA by incorporation of the wild type phenylalanine ammonia lyase (PAL, EC 4.3.1.5) from the yeast Rhodotorula glutinis into Escherichia coli underlying the ability of the wildtype PAL to convert tyrosine to PHCA. The invention is also directed to developing a new biocatalyst for conversion of glucose to PHCA by incorporation of the wildtype PAL which possesses enhanced tyrosine ammonia lyase (TAL) activity from the yeast Rhodotorula glutinis plus the

new

Disclosure; Page; 139pp; English

```
plant cytochrome p-450 and the cytochrome p-450 reductase into E. coli. Nucleic acid encoding mutant TAL enzyme is useful for producing PHCA by recombinant techniques. The recombinantly produced PHCA may be used as a monomer for production of liquid crystal polymers (LCP). LCP may be used in electronic connectors and telecommunication and aerospace applications. LCP resistance to sterrilising radiation has also enabled these materials to be used in medical devices as well as chemical, and food packaging applications. The present sequence is Rhodotorula glutinis mutant PAL. Note: This sequence is not shown in the specification, however it is constructed based on the PAL enzyme shown as SEQ.ID.NO:8 (AAE20653) in the sequence listing
```

```
밁
                                                                                                                                                                                                                                                             Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             g,
                        δ
                                                                                  Ş
                                                                                                                밁
                                                                                                                                          S
                                                                                                                                                                       밁
                                                                                                                                                                                                    Š
                                                                                                                                                                                                                                 В
                                                                                                                                                                                                                                                                                           g
                                                                                                                                                                                                                                                                                                                    Ş
                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                              S
                                                                                                                                                                                                                                                                                                                                                                                                            맑
                                                                                                                                                                                                                                                                                                                                                                                                                                      Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                   В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ŕ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      888888888888888
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Query Match
Best Local S
Matches 610
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Sequence 716 AA;
                                                                                                                                                                        534
                                                                                                                                                                                                    541
                                                                                                                                                                                                                                 474
                                                                                                                                                                                                                                                              481
                                                                                                                                                                                                                                                                                           414
                                                                                                                                                                                                                                                                                                                      421
                                                                                                                                                                                                                                                                                                                                                   354
                                                                                                                                                                                                                                                                                                                                                                                361
                                                                                                                                                                                                                                                                                                                                                                                                            294
                                                                                                                                                                                                                                                                                                                                                                                                                                         301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             174
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    114
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                121
711
                                                                                                                 594
                                                                                                                                             601
                                                                                                                                                                                                                                                                                                                                                                                                                                                                    234
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                241
                          721
                                                        651
                                                                                    661
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             ទូ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               610;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Similarity
                                                                                                                                                                                                                                                                                                        QASAVXNTMEKTRLALALIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIA
                                                                                                                                                                                                                                                                                                                                                                       DEGILRQDRYPLRTSPQWLGPLVSDMIHAHAVLSLEAGQSTTDNPLIDVENKXTHHGGNF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              NSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAITGHPDSKV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     TGFGGSADTRTEDAISLQKALLEHQLCGVLPTSXDSFXLGRGLENSLPLEVVRGAMTIRV
                             LVKMLA 726
                                                        SSPALSYLSPRIQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNV
                                                                         SSPALXYLSPRTRVLYSFVREELGVKARRGDVFLGKQEVTIGSNVSRIYEAIKSGRINXV
                                                                                                                VPRWHDAFSFAAGTVVEVLSS----TSLSLAAVNAWKVAAAESAISLTRQVRETFWSAAST
                                                                                                                                  EPRWHDAFSXATGTVVEXLSSXXXXXVSI.AAVNAWKVAXAEKAISLTRXVRXXFWXAPSS
                                                                                                                                                                        AIDLRATEFEFKKQFGPAIVSLIDQHFGSAMTGSNLRDELVEKVNKTLAKRLEQTNSYDL
                                                                                                                                                                                                    AVDLRAMEFEFKKOFXPXXXXXLLXQHFGXXXTXXXXXXXELXXKVXKXLXKRLEQTNSYDL
                                                                                                                                                                                                                                 AAAYTSELGHLANPVTTHVQPAEMANQAVNSLALISARRTTESNDVLSLLLATHLYCVLQ
                                                                                                                                                                                                                                                             AAAYTSELGHLANPVTTHVQPAEMGNQAVNSLALISARRTAEANDVLSLLLATHLYCVLQ
                                                                                                                                                                                                                                                                                        QAAAVANTMEKTRLGLAQIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIA
                                                                                                                                                                                                                                                                                                                                                   DEGILRODRYPLRTSPOWLGPLVSDLIHAHAVLTIEAGOSTTDNPLIDVENKTSHHGGNF
                                                                                                                                                                                                                                                                                                                                                                                                            QSLTAMTVEAMVGHAGSFHPFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEVKVKD
                                                                                                                                                                                                                                                                                                                                                                                                                            QALTALTVEAMVGHAGSFHPFLHDVTRDHPTQIEVARNIRTLLEGSXFAVHHEEEVKVKD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                 HVVHEGKEKILYAREAMALFNLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              HVXHEGXEKIMXAREAIALFGLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             NSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAISGHPDSKV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    TGFGGSADTRTEDAISLQKALLEHQLCGVLPSSFDSFRLGRGLENSLPLEVVRGAMTIRV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            P-TDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      PXTDDXXELDGYSLTLGDVVGAARKGRXVRVXDSDEIRXKIDKSVEFLRXQLXNSVYGVT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   MAPSIDSISHSFANGVASAKQAVNGAS-----TNLAVAGSHLPTTQVTQVDIVEKNLAA 54
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                MAPSIDSIATSXANGXXNGXHAAXXASXXXXXXXXXXXAXAGSXLPTTXXTQLDIVEXXLAD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Conservative
716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         89.7%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            24;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Score 3019; DB 5;
Pred. No. 7.2e-300;
4; Mismatches 82;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       716;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            10;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Gaps
                                                                                                                650
                                                                                                                                           660
                                                                                                                                                                        593
                                                                                                                                                                                                    600
                                                                                                                                                                                                                                 533
                                                                                                                                                                                                                                                           540
                                                                                                                                                                                                                                                                                          473
                                                                                                                                                                                                                                                                                                                      480
                                                                                                                                                                                                                                                                                                                                                   413
                                                                                                                                                                                                                                                                                                                                                                                420
                                                                                                                                                                                                                                                                                                                                                                                                            353
                                                                                                                                                                                                                                                                                                                                                                                                                                      360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                   293
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    173
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                60
```

```
cc hydroxycinnamic acid (PHCA). The invention relates to developing of a new conversion of glucose to PHCA by incorporation of the wild type phenylalanine ammonia lyase (PAL; BC 4.3.1.5) from the yeast CC which type phenylalanine ammonia process to PHCA by incorporation of the wildtype phal to convert tyrosine to PHCA. The invention is also directed to developing a new biocatalyst for conversion of glucose to PHCA by concorporation of the wildtype PAL which possesses enhanced tyrosine ammonia lyase (TAL) activity from the yeast Rhodotorula glutinis plus the plant cytochrome p-450 and the cytochrome p-450 reductase into E. coli. CC mucleic acid encoding mutant TAL enzyme is useful for producing PHCA by recombinant techniques. The recombinantly produced PHCA may be used as a componer for production of liquid crystal polymers (LCP). LCP may be used in electronic connectors and telecommunication and aerospace applications. LCP resistance to sterilising radiation has also enabled these materials to be used in medical devices as well as chemical, and the control of these materials to be used in medical devices as well as chemical, and
                                                                                                                                                                                                                                                                                                                                                                         The invention
                                                                                                                                                                                                                                                                                                                                                                                                          Claim 2; Page 98-101; 139pp; English
                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Novel nucleic acid encoding truncated mutant tyrosine ammonia lyase polypeptide, or mutant TAL polypeptide, useful for producing parahydroxycinnamic acid in recombinant host cell lacking cinnamate
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   N-PSDB;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Rhodotorula glutinis
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    phenylalanine ammonia lyase; PAL; glucose; tyrosine ammonia lyase; TA cytochrome p-450; cytochrome p-450 reductase; liquid crystal polymer; LCP; telecommunication; medical device; aerospace application; enzyme
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Para-hydroxycinnamic acid; PHCA; food packaging; electronic phenylalanine ammonia lyase; PAL; glucose; tyrosine ammonia
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               01-JUL-2002
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       27-JUL-2000; 2000US-00627216
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              23-JAN-2001; 2001WO-US002099
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         WO200210407-A1
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        biocatalyst; mutant; variant; mutein.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Rhodotorula glutinis phenylalanine ammonia lyase
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         AAE20654 standard; protein; 716
                                                                                                                                                                                                                                                                                                                                                                                                                                                    hydroxylase.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  (DUPO ) DU
                                                   packaging applications. The present sequence
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   2002-280635/32.
DB; AAD33076.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           AA,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                PONT DE NEMOURS & CO E
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Sariaslani
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               (first
                                                                                                                                                                                                                                                                                                                                                                       relates
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               entry)
                                                                                                                                                                                                                                                                                                                                                                       to methods for biological production of para-
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             FS,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Tang
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           ×
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           <u>۾</u>
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             ¥Ψ.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Vannelli
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          (PAL)
                                                     is Rhodotorula glutinis
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          mutant
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                lyase; TAL;
```

(TAL)

Sequence 716 A

Query Match

DB 5; Length 716;

Local

```
밁
                                                  Ő
                                                                                밁
Ś
                                                                                                           Š
                                                                                                                                         Best Loc
Matches
 121
                                                                                                                                         al Similarity
610; Conserv
                            ន
                                                       61
                                                                                   بـــو
                                                                                                              بر
                                                                                    MAPSIDSISHSFANGVASAKQAVNGAS
 TGFGGSADTRTEDAISLQKALLEHQLCGVLPTSXDSFXLGRGLENSLPLEVVRGAMTIRV 180
                                              PXTDDXXELDGYSLTLGDVVGAARKGRXVRVXDSDEIRXKIDKSVEFLRXQLXNSVYGVT
                                                                                                            MAPSIDSIATSXANGXXNGXHAAXXASXXXXXXXXXXAXAGSXLPTTXXTQLDIVEXXLAD
                            P-TDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVT
                                                                                                                                         89.7%; ilarity 84.0%; Conservative 2:
                                                                                                                                         Score 3019; DI
Pred. No. 7.2e
24; Mismatches
                                                                                    ----TNLAVAGSHLPTTQVTQVDIVEKMLAA
                                                                                                                                         7.2e-300;
hes 82;
                                                                                                                                          Indels
                                                                                                                                          10;
                                                                                                                                          Gaps
                                                                                   54
                            113
                                                                                                                 6
```

RESULT 11 AAE20654

```
RESULT 12
AAE16390
ID AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX AAE16
XX
                                                                                                                                                                                                                                                                                     Phenylalanine ammonia-lyase; PAL; enzyme; cinnamate; food packing; PHCA; para-hydroxycinnamic acid; tyrosine ammonia-lyase; TAL; medical device; Liquid Crystal Polymer; LCP; electronic connector; telecomunication; aerospace application; chemical; red yeast; mutant; mutein.
                                                                                                                                                                                                                              Rhodotorula
Synthetic.
    06-AUG-1999;
                                                                                                                                                                       Misc-difference
                                      03-AUG-2000;
                                                                          15-FEB-2001
                                                                                                                 WO200111071-A2
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   AAE16390
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                711
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  721
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         651
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               661
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    594
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      601
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 541
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       474
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            481
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                414
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    421
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           354
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      294
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               234
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 standard;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                LLKMLA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  LVKMLA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            EPRWHDAFSXATGTVVEXLSSXXXXXVSLAAVNAWKVAXAEKAISLTRXVRXXFWXAPSS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       DEGILRQDRYPLRTSPQWLGPLVSDMIHAHAVLSLEAGQSTTDNPLIDVENKXTHHGGNF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 HVVHEGKEKILYAREAMALFNLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       HVXHEGXEKIMXAREAIALFGLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      NSLTRGHSAVRLVVLEALTNFLNHGITDIVPLRGTISASGDLSPLSYIAAAITGHPDSKV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       SSPALSYLSPRTQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 SSPALXYLSPRTRVLYSFVREELGVKARRGDVFLGKQEVTIGSNVSRIYEAIKSGRINXV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            AIDLRATEFEFKKQFGPAIVSLIDQHFGSAMTGSNLRDELVEKVNKTLAKRLEQTNSYDL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       AAAYTSELGHLANPVTTHVQPAEMANQAVNSLALISARRTTESNDVLSLLLATHLYCVLQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             AAAYTSELGHLANPVTTHVQPAEMGNQAVNSLALISARRTAEANDVLSLLLATHLYCVLQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    QASAVXNTMEKTRLALALIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            QALTALTVEAMVGHAGSFHPFLHDVTRPHPTQIEVARNIRTLLEGSXFAVHHEEEVKVKD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           NSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAISGHPDSKV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  TGFGGSADTRTEDAISLOKALLEHQLCGVLPSSFDSFRLGRGLENSLPLEVVRGAMTIRV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 AVDLRAMEFEFKKQFXPXXXXLLXQHFGXXXTXXXXXXELXXKVXKXLXKRLEQTNSYDL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                QAAAVANTMEKTRIGIAQIGKINFTQITEMINAGMNRGIPSCLAAEDPSISYHCKGIDIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           DEGILRQDRYPLRTSPQWLGPLVSDLIHAHAVLTIEAGQSTTDNPLIDVENKTSHHGGNF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      QSLTAMTVEAMVGHAGSFHPFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEVKVKD
                                                                                                                                                                                                                                                glutinis
                                        2000WO-US021156
                                                                                                                                                                                                                                                                                                                                                                                                                      (first entry)
    99US-0147719P
                                                                                                                                                                     Location/Qualifiers 540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      726
                                                                                                                                                     /note=
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 protein;
                                                                                                                                                                                                                                                                                                                                                                                  mutant
                                                                                                                                                   "Wild type Ile
                                                                                                                                                                                                                                                                                                                                                                                  phenylalanine
                                                                                                                                                     substituted
                                                                                                                                                                                                                                                                                                                                                                                    ammonia-lyase
                                                                                                                                                     with
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      LTROVRETEWSAAST
                                                                                                                                                                                                                                                                                                                                                                                    (PAL)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       533
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                473
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      173
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    650
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        660
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              593
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 600
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             413
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      353
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 293
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         233
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                240
                    Ş
                                                        먒
                                                                                S
                                                                                                                       g
                                                                                                                                                               Ş
                                                                                                                                                                                                          8
                                                                                                                                                                                                                                      Ş
                                                                                                                                                                                                                                                                                   D;
                                                                                                                                                                                                                                                                                                             Ş
                                                                                                                                                                                                                                                                                                                                                     당
                                                                                                                                                                                                                                                                                                                                                                                              Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   멍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Query Match
Best Local S
Matches 610
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Sequence
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Claim 14; Page 68-70;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    (DUPO)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Local Similarity
les 610; Conserv
                                                                                                                                                                                                                                                361
                                                                                                                                                                                                                                                                                                                             301
                                                                                                                                                                                                                                                                                                                                                                                                                                            174
                                                            474
                                                                                               481
                                                                                                                                     414
                                                                                                                                                                       421
                                                                                                                                                                                                              354
                                                                                                                                                                                                                                                                                       294
                                                                                                                                                                                                                                                                                                                                                               234
                                                                                                                                                                                                                                                                                                                                                                                                      241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                               181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         2002-121549/16.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Vannelli
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            716 AA;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                , MT
```

δ 8 8

유성 В δ В Ş 뫄 Ş 밁 δ

```
The invention relates to a method for producing para-hydroxycinnamic acid (PHCA). The method comprises converting cinnamate to PHCA by converting glucose to phenylalanine to PHCA through the phenyl ammonia-lyase (PAL) route or by generating a new biocatalyst possessing enhanced tyrosine ammonia-lyase (TAL) activity. The method is useful for the biological production of PHCA which is useful as a monomer for the production of Liquid Crystal Polymers (LCP), where the LCP is used in electronic connectors, telecommunications and aerospace applications. LCP is also useful in medical devices, as well as chemical, and food packing applications due to its resistance to sterilising radiation. The present sequence is red yeast, Rhodotorula glutinis (Rhodosporidium toruloides) mutant PAL derived by substituting Ile at position 540 with Thr. Mutant PAL enzyme posseses enhanced TAL activity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Producing para-hydroxycinnamic acid for producing liquid crystal polymer, comprises converting cinnamate to PHCA, glucose to PHCA by phenyl ammonia lyase route, or generating a biocatalyst with tyrosine ammonia-lyase
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     PONT DE NEMOURS & CO
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        75pp; English
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         <u>۾</u>
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         WW,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Sariaslani
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ħ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Gatenby
```

유성 뭐 Ş В 8

Conservative 89.7%; 24; Score 3019; DB 5; Pred. No. 7.2e-300; 4; Mismatches 82; Length 716; Indels 10;

```
AVDLRAMEFEFKKQFXFXXXXLLXQHFGXXXTXXXXXXELXXKVXXXLLXKRLEQTNSYDL
                                                                                                                                                                                                                                                                                                                                                                                      QALTALTVEÅMVGHAGSFHPFLHDVTRPHPTQIEVARNIRTLLEGSXFAVHHEEEVKVKD
                                                                                                                                                                                                                                                                                                                                                                                                                                               HVVHEGKEKILYAREAMALFNLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                          HVXHEGXEKIMXAREAIALFGLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        NSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAITGHPDSKV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       MAPSIDSISHSFANGVASAKQAVNGAS-----TNLAVAGSHLPTTQVTQVDIVEKMLAA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       MAPSIDSIATSXANGXXNGXHAAXXASXXXXXXXXXAXAGSXLPTTXXTQLDIVEXXLAD
                                                                                                                                                                                           QASAVXNTMEKTRLALALIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          NSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAISGHPDSKV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              TGFGGSADTRTEDAISLQKALLEHQLCGVLPTSXDSFXLGRGLENSLPLEVVRGAMTIRV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 P-TDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        PXTDDXXELDGYSLTLGDVVGAARKGRXVRVXDSDEIRXKIDKSVEFLRXQLXNSVYGVT
                                                                                                       AAAYTSELGHLANPVTTHVQPAEMGNQAVNSLALISARRTAEANDVLSLLLATHLYCVLQ
                                                                                                                                                                  QAAAVANTMEKTRLGLAQIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIA
                                                                                                                                                                                                                                                                                                                                                    QSLTAMTVEAMVGHAGSFHPFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEVKVKD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   TGFGGSADTRTEDAISLQKALLEHQLCGVLPSSFDSFRLGRGLENSLPLEVVRGAMTIRV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            (J)
                                                                                                                                                                     473
                                                                                                                                                                                                                 480
                                                                                                                                                                                                                                                             413
                                                                                                                                                                                                                                                                                                          420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        173
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 113
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             120
                                                                                                                        540
                                                                                                                                                                                                                                                                                                                                                         3
5
3
                                                                                                                                                                                                                                                                                                                                                                                                   360
                                                                                                                                                                                                                                                                                                                                                                                                                                                 293
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          233
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         240
```

```
RESULT 13
ABG71955
ID ABG71
                                                                    Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Дb
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              g,
                                                                                                   The invention relates to a recombinant host comprising at least one gene conding a tyrosine ammonium lyses (TAL) activity, and at least one gene encoding a phenylalanine hydroxylase (PAH) activity. Also included are: (C (1) a method for producing para-hydroxycinnamic acid involving; (1) providing the recombinant host; and (2) growing the recombinant organism in the presence of a fermentable carbon substrate and thus producing para chydroxycinnamic acid; (2) method for producing tyrosine involving; (1) providing a recombinant organism comprising at least one gene encoding a phenylalanine hydroxylase activity; and (2) growing the recombinant organism in the presence of a fermentable carbon substrate to produce tyrosine. The presence of a fermentable carbon substrate to produce tyrosine. The presence of a fermentable carbon flow into the production of para-hydroxycinnamic acid (PHCA) which is useful as a monomer for the production of liquid crystal polymer. The present componer for the production of liquid crystal polymer. The present componer for the production of liquid crystal polymer. The present componer for the production of liquid crystal polymer. The present componer for the production of para-hydroxycinnamic acid (PHCA) which is useful as a maturally occurring variant of the R. glutinis (PAL/TAL) and the production of para-hydroxycinnamic acid the carbon flow into the componer for the production of liquid crystal polymer. The present componer for the production of liquid crystal polymer. The present componer for the production of liquid crystal polymer. The present componer for the production of liquid crystal polymer (PAL/TAL) and the present componer for the production of liquid crystal polymer.
Query Match
Best Local Similarity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Enzyme; phenylalanine ammonia-lyase; PAL; phenylalanine hydroxylase; PAH; para-hydroxycinnamic acid; tyrosine ammonium lyase; TAL; PAL/TAL; tyrosine; cinnamic acid; PHCA; liquid crystal polymer.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Novel recombinant host for producing para-hydroxycinnamic acid and tyrosine, comprises gene encoding tyrosine ammonium lyase activity gene encoding phenylalanine hydroxylase activity.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             04-MAY-2001; 2001US-0288701P
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Disclosure; Page 67-69; 69pp; English.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        WPI; 2003-058928/05
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Qi WW,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        03-MAY-2002; 2002WO-US018551
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        14-NOV-2002
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                WO200290523-A2
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Rhodtorula glutinis.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         R. glutinis PAL/TAL naturally occurring variant.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           27-JAN-2003 (first entry)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           ABG71955;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ABG71955 standard; protein; 716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   (DUPO)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 711
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           721
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           651
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 594
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         109
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   BG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Sariaslani FS,
                                                                    716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           LVKMLA 726
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    SSPALSYLSPRTQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNV 710
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              SSPALXYLSPRTRVLYSFVREELGVKARRGDVFLGKQEVTIGSNVSRIYEAIKSGRINXV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         VPRWHDARSFAAGTVVEVLSS---TSLSLAAVNAWKVAAAESAISLTRQVRETFWSAAST
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 LLKMLA 716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    EPRWHDAFSXATGTVVEXLSSXXXXXVSLAAVNAWKVAXAEKAISLTRXVRXXFWXAPSS 660
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               AIDLRATEFEFKKQFGPAIVSLIDQHFGSAMTGSNLRDELVEKVNKTLAKRLEQTNSYDL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                PONT DE NEMOURS & CO
                                                                    8
  89.7%;
84.0%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Tang
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     ×
  Score 3019; DB 6; Pred. No. 7.2e-300;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   m
                Length 716;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                and
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            650
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 593
```

```
RESULT 14
ADD36GID ADD36
ID ADD36
XX ADD36
AC ADD36
XX 29-JA
XX 29-JA
XX 1ecom
XW recom
XW recom
XW alter
XX Alter
XX ADD36
OS Rhodo
XX WO200
PD 04-SE
                                                                                                                                                                                                                                                                                                                                               Š
                                                                                                                                                                                                                                                                                                                                                                                  B,
                                                                                                                                                                                                                                                                                                                                                                                                            8
                                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ď.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       멼
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Matches
   04-SEP-2003
                                                                                                                                         Rhodosporidium glutinis EP18Km-6 mutant PAL protein SEQ ID NO:4.
                               WO2003072743-A2
                                                              Rhodosporidium
                                                                                            altered property;
                                                                                                           recombination; nucleic acid template;
                                                                                                                                                                           29-JAN-2004
                                                                                                                                                                                                                                     ADE36056 standard; protein; 716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             534
                                                                                                                                                                                                                                                                                                                      711
                                                                                                                                                                                                                                                                                                                                                                                  651
                                                                                                                                                                                                                                                                                                                                                                                                                  661
                                                                                                                                                                                                                                                                                                                                                                                                                                                 594
                                                                                                                                                                                                                                                                                                                                                                                                                                                                             601
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             541
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             474
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         481
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         414
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         421
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       354
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     294
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  234
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  301
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    181 NSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAITGHPDSKV 240
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              114
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          55
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     610; Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         61 PXTDDXXELDGYSLTLGDVVGAARKGRXVRVXDSDEIRXKIDKSVEFLRXQLXNSVYGVT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1 MAPSIDSIATSXANGXXNGXHAAXXASXXXXXXXXXXAXAGSXLPTTXXTQIDIVEXXLAD
                                                                                                                                                                                                                                                                                                                                                   LVKMLA 726
                                                                                                                                                                                                                                                                                                                                                                                                   SSPALXYLSPRTRVLYSFVREELGVKARRGDVFLGKQEVTIGSNVSRIYEAIKSGRINXV 720
                                                                                                                                                                                                                                                                                                                                                                                                                                               VPRWHDAFSFAAGTVVEVLSS----TSLSLAAVNAWKVAAAESAISLTRQVRETFWSAAST
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  QASAVXNTMEKTRLALALIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                HVVHEGKEKILYAREAMALFNLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    HVXHEGXEKIMXAREAIALFGLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           TGFGGSADTRTEDAISLQKALLEHQLCGVLPSSFDSFRLGRGLENSLPLEVVRGAMTIRV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                        EPRWHDAFSXATGTVVEXLSSXXXXXVSLAAVNAWKVAXAEKAISLTRXVRXXFWXAPSS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             AIDLRATEFEFKKQFGPAIVSLIDQHFGSAMTGSNLRDELVEKVNKTLAKRLEQTNSYDL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           AVDLRAMEFEFKKQFXPXXXXXLLXQHFGXXXXXXXXXXXXXXKVXKXLXKRLEQTNSYDL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        AAAYTSELGHLANPVTTHVQPAEMGNQAVNSLALISARRTAEANDVLSLLLATHLYCVLQ 540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         QAAAVANTMEKTRIGLAQIGKINFTQITEMINAGMNRGIPSCLAAEDPSISYHCKGIDIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      DEGILRQDRYPLRTSPQWLGPLVSDLIHAHAVLTIEAGQSTTDNPLIDVENKTSHHGGNF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           DEGILRQDRYPLRTSPQWLGPLVSDMIHAHAVLSLEAGQSTTDNPLIDVENKXTHHGGNF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              NSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAISGHPDSKV
                                                                                                                                                                                                                                                                                                                      LLKMLA
                                                                                                                                                                                                                                                                                                                                                                                 SSPALSYLSPRIQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  QALTALTVEAMVGHAGSFHPFLHDVTRPHPTQIEVARNIRTLLEGSXFAVHHEEEVKVKD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 TGFGGSADTRTEDAISLQKALLEHQLCGVLPTSXDSFXLGRGLENSLPLEVVRGAMTIRV 180
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     MAPSIDSISHSFANGVASAKQAVNGAS-----TNLAVAGSHLPTTQVTQVDIVEKMLAA 54
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         AAAYTSELGHLANPVTTHVQPAEMANQAVNSLALISARRTTESNDVLSLLLATHLYCVLQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    QSLTAMTVEAMVGHAGSFHPFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEVKVKD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          P-TDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVT
                                                                                                                                                                       (first entry)
                                                                                                                                                                                                                                                                                                                      716
                                                                                             gene
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     24;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Mismatches
                                                                                                           recombined polypeptide,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   82;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   10;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  360
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            173
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             593
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         473
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              300
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         113
                                                                                                                                                                                                                                                                                                                                                                                                                                                 650
                                                                                                                                                                                                                                                                                                                                                                                                                                                                             660
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             600
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           533
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      413
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    353
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  293
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              233
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     9
```

```
В
                                                                                                 В
                                                                                                                                                                                                         5
                                                                                                                                                                                                                                                      밁
                                                                                                                                                                                                                                                                                     Š
                                                                                                                                                                                                                                                                                                                      g
                                                                                                                                                                                                                                                                                                                                                           8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ð
                                                                                                                                      Ś
                                                                                                                                                                                                                                                                                                                                                                                                      В
                                                                                                                                                                                                                                                                                                                                                                                                                                S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                The present invention describes a method for the recombination of nucleic CC acid (NA) templates. The method comprises: (a) providing at least two CC double-stranded templates (T1, T2) having different 5' and 3' regions in CC their sense strands; (b) contacting the templates with at least one each CC of forward and reverse primers that anneal, respectively, only to the 3'-cregion of the antisense strand of T1 and to the 3'-region of the sense CC (nt); (d) separating extended primers by no more than 1000 nucleotides (nt); (d) separating extended primers from their templates; (e) reannealing the extended primers from their templates; (e) reparting CC cycles of steps (b) (e) until at least one full-length extension product, CC i.e. a recombination of T1 and T2, is obtained. Also described: (1) a CC method starting from at least one soft and sense single-CC stranded templates; (2) generating a recombination products of the new CC processes and screening the polypeptides formed for properties of the new CC processes and screening the polypeptides formed for properties different CC from those of polypeptides from either of the templates; and (3) (1) combined by method (2). The methods are useful for the recombination of combined genes that express proteins e.g. enzymes, cytokines, growth cC stability, activity or specificity. The method can be used to make C enterors, viral proteins or microbial antigens with altered properties.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Query Match
Best Local (
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Sequence 716 AA;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Recombination of nucleic acid templates, useful e.g. for producing enzymes with altered properties, is based on cyclic extension of unpaired
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Disclosure; SEQ ID NO 4; 481pp; English
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      26-FEB-2003; 2003WO-US005708
361
                                     294
                                                                      301
                                                                                                         234
                                                                                                                                            241
                                                                                                                                                                                 174
                                                                                                                                                                                                                   181
                                                                                                                                                                                                                                                        114
                                                                                                                                                                                                                                                                                             121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                               610;
                                                                                                                                                                                                                                                                                                                                  55
                                                                                                                                                                                                                                                                                                                                                                   61
                                                                                                                                                                                                                                                                                                                                                                                                        щ
                                                                                                                                                                                                                                                                                                                                                                                                                                           \vdash
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               딤
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Similarity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      ADE36055
                                                                                                                                                                                                                                                                                                                                                                                                                                      MAPSIDSIATSXANGXXNGXHAAXXASXXXXXXXXXXAXAGSXLPTTXXTQLDIVEXXLAD
                                                    QALTALTVEAMVGHAGSFHPFLHDVTRPHPTQIEVARNIRTLLEGSXFAVHHEEEVKVKD
                                                                                                                                      HVXHEGXEKIMXAREAIALFGLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                                                                                                                                                                                                 NSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAITGHPDSKV
                                                                                                                                                                                                                                                                                   TGFGGSADTRTEDAISLQKALLEHQLCGVLFTSXDSFXLGRGLENSLFLEVVRGAMTIRV
                                                                                                                                                                                                                                                                                                                                                     PXTDDXXELDGYSLTLGDVVGAARKGRXVRVXDSDEIRXKIDKSVEFLRXQLXNSVYGVT
                                                                                                                                                                                                                                                                                                                                                                                                        MAPSIDSISHSFANGVASAKQAVNGAS-----TNLAVAGSHLPTTQVTQVDIVEKMLAA
DEGILRODRYPLRTSPOWLGPLVSDMIHAHAVLSLEAGOSTTDNPLIDVENKXTHHGGNF
                                                                                                           HVVHEGKEKILYAREAMALFNLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS
                                                                                                                                                                                                                                                        TGFGGSADTRTEDAISLQKALLEHQLCGVLPSSFDSFRLGRGLENSLPLEVVRGAMTIRV
                                                                                                                                                                                                                                                                                                                                    P-TDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDKSVEFLRSQLSMSVYGVT
                                     QSLTAMTVEAMVGHAGSFHPFLHDVTRPHPTQIEVAGNIRKLLEGSRFAVHHEEEVKVKD
                                                                                                                                                                                 NSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAISGHPDSKV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               PONT DE NEMOURS & CO
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   2002US-0360279P
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                89.7%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                               24; Mismatches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Score 3019;
Pred. No. 7.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               m
                                                                                                                                                                                                                                                                                                                                                                                                                                                                               ; DB 7;
7.2e-300;
hes 82;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Length 716;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 10;
                                                                                                                                                                                                                                                                                                                                                                       120
                                                                                                                                                                                                                                                                                                                                                                                                          54
   420
                                                                                                             293
                                                                                                                                                300
                                                                                                                                                                                   233
                                                                                                                                                                                                                      240
                                                                                                                                                                                                                                                              173
                                                                          360
```

Query Match Sequence

89

. 7%;

Score 3018;

BB ۲.

Length

716

2

PAL is useful in prodn. of L-phenylalanine from cinnamic acid and an NH3 donor (process claimed). L-Phe is an essential AA and starting material for sweetener aspartame. E.coli transformants will produce PAL without induction by expensive AAs, no surfactant is needed to increase cell wal.

Claim 1;

Page 21-23; 37pp; English

```
Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                        片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             片
                                                                                                                                                                                                                                                                                                                                                                                                                      유
                                                                                                                                                                                                                                                                                                                                                                                                                                    Ó
                                                                                        New L-phenylalanine ammonia lyase and producing L-phenylalanine from cinnami
                                                                                                                     WPI; 1988-079223/12.
N-PSDB; AAN81399.
                                                                                                                                                Fukuhara N, Yoshino
Suzuki M, Makiguchi
                                                                                                                                                                                             16-SEP-1986;
                                                                                                                                                                                                                                                    EP260919-A.
                                                                                                                                                                                                                                                                    Rhodosporidium toruloides
                                                                                                                                                                                                                                                                                       Aspartame; artificial
                                                                                                                                                                                                                                                                                                                   Sequence of Rhodosporidium
                                                                                                                                                                                                                                                                                                                                    12-DEC-1990
                                                                                                                                                                                                                                                                                                                                                       AAP81099;
                                                                                                                                                                                                                                                                                                                                                                         AAP81099
                                                                                                                                                                                                                15-SEP-1987;
                                                                                                                                                                           (MITK ) MITSUI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                           661
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              594
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  534
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    54
1
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       474
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         414
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               354
                                                                                                                                                                                                                                                                                                                                                                                                                      711
                                                                                                                                                                                                                                                                                                                                                                                                                                       721
                                                                                                                                                                                                                                                                                                                                                                                                                                                        651
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 601
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        481
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            421
                                                                                                                                                                                                                                                                                                                                                                                                                                                                    SSPALXYLSPRTRVLYSFVREELGVKARRGDVFLGKQEVTIGSNVSRIYEAIKSGRINXV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            VPRWHDAPSFAAGTVVEVLSS---TSLSLAAVNAWKVAAAESAISLTRQVRETFWSAAST
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                AVDLRAMEFEFKKQFXPXXXXLLXQHFGXXXTXXXXXXBLXXKVXKXLXKRLEQTNSYDL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              standard;
                                                                                                                                                                                                                                                                                                                                                                                                                      LLKMLA 716
                                                                                                                                                                                                                                                                                                                                                                                                                                       LVKMLA 726
                                                                                                                                                                                                                                                                                                                                                                                                                                                          SSPALSYLSPRTQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 EPRWHDAFSXATGTVVEXLSSXXXXXVSLAAVNAWKVAXAEKAISLTRXVRXXFWXAPSS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  AIDLRATEFEFKKOFGPAIVSLIDOHFGSAMTGSNLRDELVEKVNKTLAKRLEOTNSYDL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      AAAYTSELGHLANPVTTHVQPAEMANQAVNSLALISARRTTESNDVLSLLLATHLYCVLQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 AAAYTSELGHLANPVTTHVQPAEMGNQAVNSLALISARRTAEANDVLSLLLLATHLYCVLQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          QAAAVANTMEKTRIGIAQIGKINFTQITEMINAGMNRGIPSCLAAEDPSLSYHCKGLDIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         QASAVXNTMEKTRLALALIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIA
                                                                                                                                                Yoshino S,
lakiguchi N;
                                                                                                                                                                                                                                                                                                                                     (first
                                                                                                                                                                             TOATSU
                                                                                                                                                                                             86JP-00215864.
                                                                                                                                                                                                                87EP-00308119
                                                                                                                                                                                                                                                                                                                                                                         protein;
                                                                                                                                                                                                                                                                                                                                   entry)
                                                                                                                                                                             MEHO
                                                                                                                                                                                                                                                                                       sweetener;
                                                                                                                                                          Yamamoto
                                                                                                                                                                                                                                                                                                                   toruloides IFO 559 cells L-Phenylalanine
                                                                                          ase and encoding DNA sequence - cinnamic acid and ammonia.
                                                                                                                                                                                                                                                                                        enzyme
                                                                                                                                                          ×
                                                                                                                                                          Se
                                                                                                                                                          'n
                                                                                                                                                           Sone
                                                                                                                                                          Ś
                                                                                                                                                           Nakajima
                                                                                                      for
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 650
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   660
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    593
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            473
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 413
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      600
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         533
```

Aest Loci Matches  Oy  Oy  Oy  Oy  Oy  Oy  Oy  Oy  Oy  O	al s 609 1 61 55 121 114 114	Similarity 83.9%; Pred. No. 9.1e-300; 9; Conservative 26; Mismatches 81; Indels 10; Gaps 3 MAPSILDSIATSXANGXXNGXXHAAXXASXXXXXXXAGSXLPTTXXTQLDIVEXXLAD 60
φ	241 F 234 F	HVXHEGXEKIMXAREAIALFGLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS 3
Qy db	301 (	QALTALTVEAMVGHAGSFHPFLHDVTRPHPTQIEVARNIRTLLEGSXFAVHHEEEVKVKD 3  :  :   :
Qy Db	361 I	DEGILRQDRYPLRTSPQWLGPLVSDMIHAHAVLSLEAGQSTTDNPLIDVENKXTHHGGNF 4
	21	<b>—</b> >
OY D	414 (	QAAAYANIMEKIKLIGLAQIIGKUNFIQLIEKULNAWNNKILIESCLAABDESDEIHCKUNDI 4 AAAYTSELGHLANPYTTHYQPAEMGNQAYNSLALISARRTAEANDYLSLLLATHLYCYLQ 5
Db	474	AAAYTSELGHLANPVTTHVQPAEMANQAVNSLALISARRTTESNDVLSLLLATHLYCVLQ 5
VO	541	AVDLRAMEFEFKKQFXPXXXXXLXQHFGXXXTXXXXXELXXKVXKXLXKRLEQTNSYDL 6
OV DB	534	efkkorgpatuslioohfgsamtgsnlrdelvekvnktlakkleotns xatgtvvexlssxxxxxyslaavnawkvaxaekaisltrxvrxxfwxa
		VPRWHDAFSFAAGTVVEVLSSTSLSLAAVNAWKVAAAESAISLTRQVRETFWSAAST 6
D QY	661	SSPALXYLSPRTRYLYSFYREELGYKARRGDYFLGKQEYTIGSNYSRIYEAIKSGRINXY 7
γQ	721	LVKMLA 726
DЬ		

• 4.

```
Run
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Database
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Post-processing: Minimum Match 0%
Maximum Match 100%
Listing first 45 summaries
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Minimum DB
Maximum DB
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Searched:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Scoring table:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Sequence:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Title:
Perfect score:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           OM protein -
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Total number of hits satisfying chosen parameters:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Pred. No. is the number of results predicted by chance to have a score greater than or equal to the score of the result being printed, and is derived by analysis of the total score distribution.
                                                                                                                                                                                                                                                                                                                                                                                                             3021
2951
2922:5
969
965
958.5

95.5

95.5

95.6

95.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6

94.6
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Score
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             seq length: 0
seq length: 2000000000
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           protein search, using sw model
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 %
Query
Match
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          PIR 78:*

1: pir1:*

2: pir2:*

3: pir3:*

4: pir4:*
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   BLOSUM62
Gapop 10.0 , Gapext 0.5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      US-09-939-408A-21
3365
1 MAPSLDSIATSXANG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         September 9, 2004, 09:58:38; Search time 29.1203 Seconds (without alignments) 2398.154 Million cell updates/sec
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               283366 seqs, 96191526 residues
MAPSIDSIATSXANGXXNGX......RIYEAIKSGRINXVLVKMLA 726
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GenCore version 5.1.6
Copyright (c) 1993 - 2004 Compugen Ltd.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Length
DB
A256628
A25607
S01999
G84787
S526475
T09777
S064475
T09777
S044726
S144726
S144726
S144726
S144726
S144726
S144727
T103663
S25303
T12743
T142969
T142969
T14296
S16313
JC5872
S70916
S70916
S70916
S70916
S70916
S70916
S70916
S70916
S70916
S70916
S70916
S70916
S70916
S70916
S70916
S70916
S70916
S70916
S70916
S70916
S70916
S70916
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        SUMMARIES
                                                                                                   phenylalanine phenylalanine phenylalanine
                                                                                                                                                      phenylalanine phenylalanine phenylalanine
                                                                                                                                                                                                      phenylalanine
phenylalanine
phenylalanine
phenylalanine
phenylalanine
phenylalanine
phenylalanine
phenylalanine
                                                                                                                                                                                                                                                                                                                                            phenylalanine
phenylalanine
phenylalanine
phenylalanine
phenylalanine
phenylalanine
                                                                                                                                                                                                                                                                                                                                                                                                                                 phenylalanine phenylalanine phenylalanine
                phenylalanine
phenylalanine
phenylalanine
                                                                   phenylalanine
phenylalanine
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    phenylalanine
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Description
                                                                                                                                                                                                                                                                                                                               phenylalanine
```

RESULT 1 A56628 phenylalanine ammonia-lyase (EC 4.3.1. C;Species: Biodosporidium toruloides C;Date: 22-0ul-1995 #sequence_revision C;Acquession: A56628 C;Date: 22-0ul-1995 #sequence_revision C;Acquession: A56628 C;Acquession: A56628 A;Reference number: A56628; MUID:92127 A;Accession: A56628 A;Cross-references: GB:X51513; NUID:92127 A;Accession: A56628 A;Cross-references	
Compared com	30 910 27.0 710 2 33.1 906.5 26.9 710 2 33.2 898.5 26.6 707 2 33.3 893.5 26.5 619 2 33.4 892.5 26.5 700 2 33.6 874 25.0 582 2 33.6 874 25.0 582 2 33.6 664 19.6 505 2 33.9 664 19.0 605 2 33.9 664 19.0 605 2 33.9 664 19.0 605 2 33.0 605 2 33.0 605
Oridium toruloides Obrum, H.  Obr	\$04128 phenylalanine ammo \$60042 phenylalanine ammo \$60042 phenylalanine ammo \$29029 phenylalanine ammo \$29029 phenylalanine ammo \$52632 phenylalanine ammo \$52632 phenylalanine ammo \$604185 phenylalanine ammo \$604129 phenylalanine ammo phenylalanine ammo \$64129 phenylalanine ammo \$64129 phenylalanine ammo \$64129 phenylalanine ammo \$64129 phenylalanine ammo \$64129 phenylalanine ammo \$64129 phenylalanine ammo \$64129 phenylalanine ammo \$64129 phenylalanine ammo \$64129 phenylalanine ammo \$64129 phenylalanine ammo \$64129 phenylalanine ammo \$64129 phenylalanine ammonia-\$64129 phenylalanine ammon

G

```
C;Keywords: ammonia-lyase; carbon-nitrogen lyase F;188-190/Cross-link: 5-imidazolinone (Ala-Gly) #status predicted F;189/Modified site: dehydroalaxine (Ser) #status predicted
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        A; Molecule type: DNA
A; Residues: 1-693 < ANS >
A; Cross references: GB.M18261; NID:g169745; PIDN:AAA33883.1;
C; Superfamily: histidine ammonia-lyase
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      R;Anson, J
Gene 58, 18
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             RESULT
A29607
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             A; Reference number: A29607; A; Accession: A29607
                                                                                                                                                                                                                                                                                                                                                                                                                                                          Query Match
Best Local S
Matches 590
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           ;Species: Rhodosporidium toruloides
;Date: 15-Dec-1988 #sequence_revision 15-Dec-1988 #text_change;Accession: A29607
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    finine ammonia-lyase (EC 4.3.1.5) - fungus (Rhodosporidium toruloides)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Complete nucleotide
                         344
                                                                254
                                                                                                    284
                                                                                                                                         194
                                                                                                                                                                                                                       134
                                                                                                                                                                               224
                                                                                                                                                                                                                                                            164
                                                                                                                                                                                                                                                                                                                                          104
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     651
                                                                                                                                                                                                                                                                                                  74
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        711
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              721
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           661
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   594
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      601
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              534
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   541
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           474
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               481
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      414
                                                                                                                                                                                                                                                                                                                                                                               5
                                                                                                                                                                                                                                                                                                                                                                                                                     44
                                                                                                                                                                                                                                                                                                                                                                                                                                                               590;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              421
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    354
                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Similarity
EGSXFAVHHEEEVKVKDDEGILRQDRYPLRTSPQWLGPLVSDMIHAHAVLSLEAGQSTTD
                                                                                                                                                                                                                                                    ENSLPLEVVRGAMTIRVNSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLS
                                                                                                                                                                                                                                                                                                                       SVEFLRXQLXNSVYGVTTGFGGSADTRTEDAISLQKALLEHQLCGVLFTSXDSFXLGRGL
                                                                                     SMATLALHDAHMLSLLSQALTALTVEAMVGHAGSFHPFLHDVTRPHPTQIEVARNIRTLL
                                                                                                                                                                       PLSYIAAAITGHPDSKVHVXHEGXEKIMXAREAIALFGLEPVVLGPKEGLGLVNGTAVSA
                                                                                                                                                                                                                                                                                                SVEFLRSQLSMSVYGVTTGFGGSADTRTEDAISLQKALLEHQLCGVLPSSFDSFRLGRGL
                                                          SMATLALHDAHMLSLLSQSLTAMTVEAMVGHAGSFHPFLHDVTRPHPTQIEVAGNIRKLL
                                                                                                                                       PLSYTAAAISGHPDSKVHVVHEGKEKILYAREAMALFNLEPVVLGPKEGLGLVNGTAVSA
                                                                                                                                                                                                                  ENSLPLEVVRGAMTIRVNSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLS
                                                                                                                                                                                                                                                                                                                                                                             PTTQVTQVDIVEKMLAAP-TDSTLELDGYSLNLGDVVSAARKGRPVRVKDSDEIRSKIDK
                                                                                                                                                                                                                                                                                                                                                                                                        PTTXXTQLDIVEXXLADPXTDDXXELDGYSLTLGDVVGAARKGRXVRVXDSDEIRXKIDX
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              EPRWHDAFSXATGTVVEXLSSXXXXXVSLAAVNAWKVAXAEKAISLTRXVRXXFWXAPSS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        LLKMLA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              LVKMLA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 SSPALSYLSPRTQILYAFVREELGVKARRGDVFLGKQEVTIGSNVSKIYEAIKSGRINNV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                SSPALXYLSPRTRVLYSFVREELGVKARRGDVFLGKQEVTIGSNVSRIYEAIKSGRINXV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           AVDLRAMEFEFKKQFXPXXXXLLXQHFGXXXTXXXXXXELXXKVXXXXLXKRLEQTNSYDL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            VPRWHDAFSFAAGTVVEVLSS---TSLSLAAVNAWKVAAAESAISLTRQVRETFWSAAST
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     AAAYTSELGHLANPVTTHVQPAEMANQAVNSLALISARRTTESNDVLSLLLATHLYCVLQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             DEGILRODRYPLRTSPOWLGPLVSDLIHAHAVLTIEAGOSTTDNPLIDVENKTSHHGGNF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       AIDLRAIEFEFKKQFGPAIVSLIDQHFGSAMTGSNLRDELVEKVNKTLAKRLEQTNSYDL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                AAAYTSELGHLANPVTTHVQPAEMGNQAVNSLALISARRTAEANDVLSLLLATHLYCVLQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  QAAAVANIMEKTRIGIAQIGKINFTQITEMINAGMNRGIPSCLAAEDPSISYHCKGIDIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      QASAVXNTMEKTRLALALIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Gilbert, H.J.; Oram, J.D.; Minton, 99, 1987
                                                                                                                                                                                                                                                                                                                                                                                                                                                            Conserv
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        716
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              726
                                                                                                                                                                                                                                                                                                                                                                                                                                                                           87.7%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ve
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              sequence of the Rhodosporidium MUID:88112870; PMID:2828184
                                                                                                                                                                                                                                                                                                                                                                                                                                                        Score 2951; DB 2;
Pred. No. 2.4e-224
3; Mismatches 66
                                                                                                                                                                                                                                                                                                                                                                                                                                                                             .4e-224;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      N.P.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Length 693;
                                                                                                                                                                                                                                                                                                                                                                                                                                                        Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               toruloides gene coding
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 PID:g169746
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              16-Jul-1999
                                                                                                                                                                                                                                                                                                                                                                                                                                                        4
                                                                                                                                                                                                                                                                                                                                                                                                                                                      Gaps
                                                                                                343
                                                                                                                                     253
                                                                                                                                                                           283
                                                                                                                                                                                                                  193
                                                                                                                                                                                                                                                        223
                                                                                                                                                                                                                                                                                              133
                                                                                                                                                                                                                                                                                                                                   163
                                                                                                                                                                                                                                                                                                                                                                           73
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   710
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            650
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  660
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          593
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             600
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     533
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            540
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  473
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               413
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    (strain
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 for
                                                                                             g
                                                                                                                                 Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                A;Cross-references: EMBL:X13094; NID:g3284; PIDN:CAA31486.1; PID:g295942 R;Vaslet, C.A.; Strausberg, R.L.; Sykes, A.; Levy, A.; Filpula, D. Nucleic Acids Res. 16, 11382, 1988 A;Title: cDNA and genomic cloning of yeast phenylalanine ammonia-lyase gian, Reference number: S01990; MUID:89083583; PMID:3205750
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        phenylalanine ammonia-lyase (EC 4.3.1.5) - fungus (Rhodotorula rubra)
(;Species: Rhodotorula rubra
C;Date: 30-Sep-1989 #sequence_revision 30-Sep-1989 #text_change 16-Jul-1999
C;Accession: S01999; S01990
R;Filpula, D.; Vaslet, C.A.; Levy, A.; Sykes, A.; Strausberg, R.L.
Nucleic Acids Res. 16, 11381, 1988
A;Title: Nuclectide sequence of gene for phenylalanine ammonia-lyase from Ri
A;Reference number: S01999; MUID:89083582; PMID:3205749
                    밁
                                                5
                                                                                                                                                                           밁
                                                                                                                                                                                                        Ś
                                                                                                                                                                                                                                                                                                                             C;Superfamily: histidine ammonia-lyase
C;Keywords: ammonia-lyase; carbon-nitrogen lyase
F;217-219/Cross-link: 5-imidazolinone (Ala-Gly) #status predicted
F;218/Modified site: dehydroalanine (Ser) #status predicted
                                                                                                                                                                                                                                                                                                                                                                                                                                   A;Cross-references: EMBL:X13095 C;Genetics:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                       A;Status: translation not shown A;Molecule type: mRNA A;Residues: 1-674 <VAS>
                                                                                                                                                                                                                                                                                                                                                                                                            A; Introns: 110/2; 139/2; 372/3; 428/2; 482/3
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   A; Reference number: A; Accession: S01990
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  A; Molecule type: DNA
A; Residues: 1-713 <FIL>
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        A; Accession: S01999
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   뮹
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     맑
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                         Query Match
Best Local
                                                                                                                                                                                                                                                                           Local Similarity
                    120
                                                        121
                                                                                                                                                                                                                                                      595;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       644
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             554
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     671
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          704
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  611
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   584
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            494
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                524
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        434
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             464
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     374
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          404
                                                                                                60
                                                                                                                                   61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                314
                                                                                                                                                                           Д
                                                                                                                                                                                                                  -ب
                                       TGFGGSADTRTEDAISLQKALLEHQLCGVLPTSXDSFXLGRGLENSLPLEVVRGAMTIRV
                                                                                           AGATDQIXLDGYTLTLGDVVGAARRGRSVXVADSPHIREKIDASVEFLRTQLDNSVYGVT
                                                                                                                                                                                                              MAPSIDSIATSXANGXXNGXHAAXXASXXXXXXXXXXAXAGSXIPTTXXTQIDIVEXXLAD
                                                                                                                           PXTDDXXELDGYSLTLGDVVGAARKGRXVRVXDSDEIRXKIDKSVEFLRXQLXNSVYGVT
                                                                                                                                                                         MAPSVDSIATSVANSLSNGLHAAAAAN-GGDVHKKTAGAGSLLPTTETTQLDIVERILAD
                    TGFGGSADTRTEDAISLQKALLEHQLCGVLPTSMDGFALGRGLENSLPLEVVRGAMTIRV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                NVSRIYEAIKSGRINXVLVKMLA 726
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               NDVLSLLLATHLYCVLQAVDLRAMEFEFKKQFXPXXXXLLXQHFGXXXTXXXXXXELXXX
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     NVSKIYEAIKSGRINNVLLKMLA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           VNKTLAKRLEQTNSYDLVPRWHDAFSFAAGTVVEVLSS---TSLSLAAVNAWKVAAAESA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          AAEDPSLSYHCKGLDIAAAAYTSELGHLANPVTTHVQPAEMGNQAVNSLALISARRTAEA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 NPLIDVENKTSHHGGNFQAAAVANTMEKTRLGLAQIGKLNFTQLTEMLNAGMNRGLPSCL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                ISLITROVRETFWSAASTSSPALSYLSPRIQILYAFVREELGVKARRGDVFLGKQEVTIGS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ISLTRXVRXXFWXAPSSSSPALXYLSPRTRVLYSFVREELGVKARRGDVFLGKQEVTIGS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              VXKXLXKRLEQTNSYDLEPRWHDAFSXATGTVVEXLSSXXXXXVSLAAVNAWKVAXAEKA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      NDVLSLLLATHLYCVLQAIDLRAIEFEFKKQFGPAIVSLIDQHFGSAMTGSNLRDELVEK
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   AAEDPSLSYHCKGLDIAAAAYTSELGHLANPVTTHVQPAEMANQAVNSLALISARRTTES
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            NPLIDVENKXTHHGGNFQASAVXNTMEXTRLALIALIGKLNFTQLTEMLNAGMNRGLPSCL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            EGSRFAVHHEEEVKVKDDEGILRQDRYPLRTSPQWLGPLVSDLIHAHAVLTIEAGQSTTD
                                                                                                                                                                                                                                                      Conservative
                                                                                                                                                                                                                                                    86.8%; Score 2922.5; DB 2;
82.0%; Pred. No. 4.4e-222;
tive 33; Mismatches 85;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     693
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      phenylalanine ammonia-lyase genes PMID:3205750
                                                                                                                                                                                                                                                      Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  ammonia-lyase from Rhodotorula
                                                                                                                                                                                                                                                                                         Length
                                                                                                                                                                                                                                                                                       713;
                                                                                                                                                                                                                                                      13;
                                                                                                                                                                                                                                                  Gaps
                                                                                                                                   120
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   703
                                                                                           119
                                                                                                                                                                         59
                                                                                                                                                                                                              60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                670
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           610
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 643
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                583
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 433
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     493
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         523
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        463
                                                                                                                                                                                                                                                      ຫ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         reveal
```

gei

Ś 밁 5 В Ş 뮍 Ś В S B S 밁

Ś g 8 g Ş

В Ś 멍 γQ Вb Ş

A;Accession: PQ0140 A;Molecule type: DNA A;Residues: 1-240 <ohl> A;Cross-references: GB:X62747; NID:g16408; PIDN:CAA44609.1; PID:g16409 A;Cross-references: Gb:X62747; NID:g16408; PIDN:CAA44609.1; PID:g16409 A;Experimental source: Ecotype Columbia C;Comment: Phenylalanine ammonia-lyase catalyzes the deamination of L-phenylalanine to the comment of th</ohl>	Qy 40 GSXLPTTXXTQLDIVEXXLADPXTDDXXELDGYSLTLGDVVGAARKGRXVRVXDSDEIRX 99   ;
R;Ohl, S.; Hedrick, S.A.; Chory, J.; Lamb, C.J.  Plant Cell 2, 837-848, 1990  A;Title: Functional properties of a phenylalanine ammonia-lyase promoter from Arabidops:  A;Reference number: PQ0140; MUID:93005677; PMID:2152131	Query Match 28.8%; Score 969; DB 2; Length 725; Best Local Similarity 35.5%; Pred. No. 3.3e-68; Matches 258; Conservative 120; Mismatches 257; Indels 92; Gaps 21;
A;Molecule type: DNA A;Residues: 1-725 <mann 1-725="" 1994<="" <mann="" a;note:="" a;residues:="" a;ross-references:="" data="" embl="" embl:l33677;="" june="" library,="" nid:g497418;="" nucleotide="" pid:g497419="" pidn:aac18870.1;="" sequence="" submitted="" td="" the="" to="" was=""><td>A;Gene: At0937040 A;Map position: 2 C;Superfamily: histidine ammonia-lyase</td></mann>	A;Gene: At0937040 A;Map position: 2 C;Superfamily: histidine ammonia-lyase
A,Title: The phenylalanine ammonia-lyase gene family in Arabidopsis thaliana. A,Reference number: S52990; MUID:95195160; PMID:7888622 A,Recession: S52990  A.Recession: S52990  A.Recession: S52990	A;Status: preliminary A;Molecule type; DNA A;Residues: 1-725 <sto> A;Residues: 1-725 <sto> A;Cross-references: GB:AE002093; NID:g6598547; PIDN:AAD18156.2; GSPDB:GN00139</sto></sto>
C;Date: 14.Jul-1995 #sequence_revision 21-Jul-1995 #text_change 16-Jul-1999 C;Accession: S52990; PQ0140 C;Accession: S52990; PQ0140 C;Accession: Mare, D.; Somssich, I.E.; Davis, K.R.	A;Title: Sequence and analysis of chromosome 2 of the plant Arabidopsis thaliana. A;Reference number: A84420; MUID:20083487; PMID:10617197 A;Accession: G84787
RESULT 5 \$52990 phenylalanine ammonia-lyase (EC 4.3.1.5) 1 - Arabidopsis thaliana C.Species Arabidopsis thaliana (mouse-ear cross)	R;Lin, X.; Kaul, S.; Rounsley, S.D.; Shea, T.P.; Benito, M.I.; Town, C.D.; Fujii, C.Y.; R;Lin, X.; Kaul, S.; Rounsley, S.D.; Shea, T.P.; Benito, M.I.; Town, C.D.; Fujii, C.Y.; M.; Koo, H.; Moffat, K.S.; Cronin, L.A.; Shen, M.; VanAken, S.E.; Umayam, L.; Tallon, L. euss, D.; Nierman, W.C.; White, O.; Eisen, J.A.; Salzberg, S.L.; Fraser, C.M.; Venter, J. Nierman, W.C.; White, O.; Eisen, J.A.; Salzberg, S.L.; Fraser, C.M.; Venter, J. Nierman, W.C.; White, O.; Eisen, J.A.; Salzberg, S.L.; Fraser, C.M.; Venter, J. Nierman, W.C.; White, O.; Eisen, J.A.; Salzberg, S.L.; Fraser, C.M.; Venter, J. Nierman, W.C.; White, O.; Eisen, J.A.; Salzberg, S.L.; Fraser, C.M.; Venter, J. Nierman, W.C.; White, O.; Eisen, J.A.; Salzberg, S.L.; Fraser, C.M.; Venter, J. Nierman, W.C.; White, O.; Eisen, J.A.; Salzberg, S.L.; Fraser, C.M.; Venter, J. Nierman, W.C.; White, O.; Eisen, J.A.; Salzberg, S.L.; Fraser, C.M.; Venter, J. Nierman, W.C.; White, O.; Eisen, J.A.; Salzberg, S.L.; Fraser, C.M.; Venter, J. Nierman, W.C.; White, O.; Eisen, J.A.; Salzberg, S.L.; Fraser, C.M.; Venter, J. Nierman, W.C.; White, O.; Eisen, J.A.; Salzberg, S.L.; Fraser, C.M.; Venter, J. Nierman, W.C.; White, O.; Eisen, J.A.; Salzberg, S.L.; Fraser, C.M.; Venter, J. Nierman, W.C.; White, W. White, O.; Eisen, J. Nierman, W.C.; White, W. White, O.; Eisen, J. Nierman, W.C.; White, W. Whit
B DPMMECL	G84/8/ phenylalanine ammonia lyase (PALI) [imported] - Arabidopsis thaliana C;Species: Arabidopsis thaliana (mouse-ear cress) C;Date: 02-Feb-2001 #sequence_revision 02-Feb-2001 #text_change 16-Feb-2001
653	RESULT 4
Æ	Db 708 LVKMA 713
Qy 613 GTVVEXLSSXXXXVSLAAVVA	Db 648 SSPALKYLSPRTRVLYSFVREEVGVKARRGDVYLGKQEVTIGTNVSRIYEAIKSGCIAPV 707 Qy 721 LYKMLA 726
544TVKNTVSQVAKKVLTTGVNGELHPSRFCEKDLLKVVDREQVYTYADDPCSAT	PALXYLSPRTRVLYSFVRBBLGVKARRGDVFLGKQEVTIGGNVSRIYEAIKGGRINXV
570	591 EQRMHDTFSVATGAVVEALAGQEVSLASLNAWKVACAEXAIALTRSVRDSFWAAPSS 64
QY 510 NSLALISARRTAEANDVLSLLLATHLYCVLQAVDLRAMEFEEKKQFXPXXXXLLXQHFGX 569	Db 536 AVDLRAMEFEHTKAFEPMVTELLKQHFGALATAEVEDKVRKSIYKRLQQNNSYDL 590
Db 440 VNDFYNNGLESULTASRNPSLDYGFKGAEIAMASYCSELQYLANPVTSHVQSAEQHNQDV 499	OD 476 AAAXTSEIGHLANPVSTHVQPAEMGNQAINSLALISAKKTAEANDVLSLLLAIHLIXCVLQ 535  QY 541 AVDLRAMEFEEKKQFXXXXXXLLXQHFQXXXTXXXXXXXELXXKVXKXLXKRLEQTNSYDL 600
380	481 AAAYTSELGHLANDVTTHVQDAEMGNQAVNSLALISARRTAEANDVLSLLLATHLYCVLQ 5
Db 327 AAIMEHILDGSSYMKLAQKLHEMDPLQKPKQDRYALRTSPQWLGPQIEVIRYA 379  Qy 392 VLSLEAG-QSTTDNPLIDVENKXTHHGGNFQASAVXNTMEKTRLALALIGKLNFTQLTEM 450	Qy 421 QASAVXNTMEKTRLALALIGKLNFTQLTEMLNAGMNRGLPSCLAAEDPSLSYHCKGLDIA 480
336	356 DEGILRODRYPLRCSPOWLGPLVSDMIHAHAVLSLEAGOSTTDNPLIDLENKMTHHGGAF 4
Qy 276 VNGTAVSASVATLALHDAHMLSLLSQALTALTVEAMVGHAGSFHPFLHDVTRPHPTQIEV 335       : : : : : : :	Db 296 QALTALTVEAMVGHAGSFHPFLHDVTRPHPTQIEVARNIRTLLEGSKYAVHHETEVKVKD 355
Db 211 ASGDLVPLSYLAGLLTGRPNSKA-TGPNGEALTAEEAFKLAGISSGFFDLQPKEGLAL 267	Qy 301 QALTALTVEANVGHAGSFHPFLHDVTRPHPTQIEVARNIRTLLEGSXFAVHHEEEVKVKD 360
157	241 HYXHEGXEKINXAREAIALFGLEPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLS 3
Db 99 GVNASSDWVMESMNKGTDSYGVTTGFGATSHRRTKNGVALQKELIRFLNAGIFGSTKET- 156  Qy 158 XLGRGLENSLPLEVVRGAMTIRVNSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTIS 217	Qy 181 NSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAITGHPDSKV 240

ω σ

```
RESULT 6
306475
phenylalanine ammonia-lyase (EC 4.3.1.5) -
(;Species: Oryza sativa (rice)
(;Species: 30-8ep-1991 #sequence revision 30-S
(;Accession: S06475; M33246; 700156
R;Minami, E; Ozeki, Y; Matsuoka, M.; Koiz
Eur. J. Biochem. 185, 19-25, 1989
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    C;Genetics:
A;Gene: PALI
A;Introns: 143/2
A;Introns: 143/2
C;Superfamily: histidine ammonia-lyase
C;Superfamily: histidine ammonia-lyase
C;Keywords: ammonia-lyase; carbon-nitrogen lyase
F;211-213/Cross-link: 5-imidazolinone (Ala-Gly) #
F;212/Modified site: dehydroalanine (Ser) #status
                                                                                                                                                                                8
                                                                                                                                                                                                                  유 성
                                                                                                                                                                                                                                                                           ф
                                                                                                                                                                                                                                                                                                           $
                                                                                                                                                                                                                                                                                                                                                    B 8
                                                                                                                                                                                                                                                                                                                                                                                                          В
                                                                                                                                                                                                                                                                                                                                                                                                                                        Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   유
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Query Match
Best Local Sim
Matches 258;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Local Similarity
                                                                                                                                                                                                                         653
                                                                                                                                                                                                                                                         660
                                                                                                                                                                                                                                                                                                                                                      544
                                                                                                                                                            708
                                                                                                                                                                                                                                                                                         596
                                                                                                                                                                                                                                                                                                                                                                                    570
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 440
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               451
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             380
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             392
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             327
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          268
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        276
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       211
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     157
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     158
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     218
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  100
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   98
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  39
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                40
                                                                                                                                                            DPMMECL
                                                                                                                                                                                         XVLVKML
                                                                                                                                                                                                                         GTSAIPNRIKECRSYPLYRFVREELGT----
                                                                                                                                                                                                                                                                                      YPLIQKLRQ---VIVDHALVNGESEKNAVTSIFHKIGAFEEELKAVLPKEVEAARAAYDN
                                                                                                                                                                                                                                                                                                                    GTVVEXLSSXXXXXVSLAAVNA------WKVAXAEKAIS--LTRXVRXXFWXAPS
                                                                                                                                                                                                                                                                                                                                                                                                                                          NSLALISARRTAEANDVLSLLLATHLYCVLQAVDLRAMEFEFKKQFXPXXXXLLXQHFGX
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        LNAGMNRGLPSCL-AAEDPSLSYHCKGLDIAAAAYTSELGHLANPYTTHVQPAEMGNQAV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ASGDLVPLSYIAGLLTGRPNSKA-TGPNG--EALTABEAFKLAGISSGFFDLQPKEGLAL
                                                                                                                                                                                                                                                    SSSPALXYLSP-RTRVLYSFYREELGVKARRGDVFLGKQEVTIGSNVSRIYEAIKSGRIN
                                                                                                                                                                                                                                                                                                                                                  --TVKNTVSQVAKKVLTTGVNGELHPSRFCEKDLLKVVDREQVYTYADDP-----CSAT
                                                                                                                                                                                                                                                                                                                                                                                    XXTXXXXXXELXXKV----
                                                                                                                                                                                                                                                                                                                                                                                                                 NSLGLISSRKTSEAVDILKLMSTTFLVAICQAVDLRHLEENLRQ---
                                                                                                                                                                                                                                                                                                                                                                                                                                                                               VNDFYNNGLPSNLTASRNPSLDYGFKGAETAMASYCSELQYLANPVTSHVQSAEQHNQDV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            TKSTEREINSVNDNPLIDVSRNKATHGGNFQGTPTGVSMDNTRLATRATGKLMFAQFSEL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        VLSLEAG-QSTTDNPLIDVENKXTHHGGNFQASAVXNTMEXTRLALALIGKLNFTQLTEM
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   VNGTAVSASMATLALHDAHMLSLLSQALTALTVEAMVGHAGSFHPFLHDVTRPHPTQIEV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              ASGDLSPLSYIAAAITGHPDSKVHVXHEGXEKIMXAREAIALFGLEP--VVLGPKEGLGL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  ----SHTLPHSATRAAMLVRINTLLQGFSGIRFEILEAITSFLNNNITPSLPLRGTIT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                XLGRGLENSLPLEVVRGAMTIRVNSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTIS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GVNASSDWVMESMNKGTDSYGVTTGFGATSHRRTKNGVALQKELIRFLNAGIFGSTKET-
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              KIDKSVEFLRXQLXNSV--YGVTTGFGGSADTRTEDAISLQKALLEHQLCGVLFTSXDSF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GAAAEQMKGSHLDEVKRMVAE-FRKPVVNLGGETLTIGQVAAISTIGNSVKVELSETARA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              GSXLPTTXXTQLDIVEXXLADPXTDDXXELDGYSLTLGDVVGAARKGRXVRVXDSDEIRX
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        AAVMEHILDGSSYMKLAQKLHEMDPLQKP-----KQDRYALRTSPQWLGPQIE--VIRYA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        ARNIRTLLEGSXF----AVHHEEEVKVKDDEGILRODRYPLRTSPOWLGPLVSDMIHAHA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       VNGTAVGSGMASMVLFETNVLSVLAEILSAVFAEVMSGKP-EFTDHLTHRLKHHPGQIEA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           28.7%; Score 965; DB 2; I larity 35.5%; Pred. No. 6.9e-68; Conservative 119; Mismatches 258;
               Koizuka,
                                             30-Sep-1991
                                                                                                                                                                                                                                                                                                                                                                                 -----XKXLXKRL--EQTNSYDLEPRWHDAFSXAT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        a-Gly) #status predicted
#status predicted
                                                                               rice
                                                                                                                                                                                                                         ELLTGEKVTSPGEEFDKVFTÄICEGKII
                z
                                           #text_change
                Tanaka,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Length 725;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Gaps
                                                                                                                                                                                                                         707
                                                                                                                                                                                                                                                                                                                                                                                 612
                                                                                                                                                                                                                                                      718
                                                                                                                                                                                                                                                                                      652
                                                                                                                                                                                                                                                                                                                    659
                                                                                                                                                                                                                                                                                                                                                                                                                 543
                                                                                                                                                                                                                                                                                                                                                                                                                                                                             499
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             509
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            439
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        450
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          379
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        391
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       335
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       326
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     267
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   275
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   210
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  217
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                156
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              157
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                97
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              9
```

```
A;Title: Structure and some characterization of the gene for ph A;Reference number: JQ0156; MUID:90032676; PMID:2806257
A;Accession: S06475
A;MClecule type: DNA
A;Cross-references: EMBL:X16099
A;Cross-references: EMBL:X16099
A;Cross-references: EMBL:X16099
A;Cross-references: EMBL:X16099
A;Cross-references: EMBL:X16099
A;Accession: A33246
A;Accession: A33246
A;Accession: A33246
A;Accession: A33246
A;MClecule type: mRNA
A;Residues: 1-86,'N',88-302,'E',304-701 <MIN2>
C;Genetics:
A;Introns: 122/2
C;Superfamily: histidine ammonia-lyase
C;Keywords: ammonia-lyase; carbon-nitrogen lyase
F;189-191/Cross-link: 5-imidazolinone (Ala-Gly) #status predicted
F;190/Modified site: dehydroalanine (Ser) #status predicted
                         8
                                                                                         8
                                                                                                                                                             Ş
                                                                                                                                                                                               ₽,
片
                                                                g,
                                                                                                                                 밁
                                                                                                                                                                                                                                S
                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                              δ.
                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                    Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                 8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           B,
                                                                                                                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            吊
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              뮹
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Query Match
Best Local :
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Local Similarity
                                671
                                                                597
                                                                                                627
                                                                                                                                  538
                                                                                                                                                                   570
                                                                                                                                                                                                     478
                                                                                                                                                                                                                                     510
                                                                                                                                                                                                                                                                     418
 641
                                                                                                                                                                                                                                                                                                     451
                                                                                                                                                                                                                                                                                                                                        358
                                                                                                                                                                                                                                                                                                                                                                        392
                                                                                                                                                                                                                                                                                                                                                                                                        303
                                                                                                                                                                                                                                                                                                                                                                                                                                        334
                                                                                                                                                                                                                                                                                                                                                                                                                                                                         244
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           274
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           187
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             135
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               156
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  255;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                75
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                16
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  40
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                98
 RSFPLYRFVREELGC--
                            RTRVLYSFYREELGVKARRGDYFL-GKQEVTIGSNVSRIYEAIKSGRI
                                                              RGLRVLQDHQVRGG----
                                                                                                VSLAAVNAWKVAXAEKAISLTRXVRXXFWXAPSSSSP--
                                                                                                                                  NPTGDLSSARFSEKNLLTAIDR-EAVFSYADDPCSANYPLMQKLRAVLVEHALTSGDRRA
                                                                                                                                                                   XXTXXXXXXELXXKVXKXLXKRLEQTNSYDLEP--RWHDAFSXATGTVVE-XLSSXXXXX
                                                                                                                                                                                                   NSIGIVSARKTLEAVDIIKLMTSTYIVALCQAVDLRHLEENIKSSVKNCVTQVAKKVLTM
                                                                                                                                                                                                                              NSLALISARRTAEANDVLSLLLATHLYCVLQAVDLRAMEFEFKKQFXPXXXXLLXQHFGX
                                                                                                                                                                                                                                                                   VNEFYNNGLTSNIAGSRNPSLDYGFKGTEIAMASYSSELQYLANPITNHVQSAEQHNQDV
                                                                                                                                                                                                                                                                                                     LNAGMNRGLPSCLA-AEDPSLSYHCKGLDIAAAAYTSELGHLANPVTTHVQPAEMGNQAV
                                                                                                                                                                                                                                                                                                                                                           VLSLEAG-QSTTDNPLIDVENKXTHHGGNFQASAVXNTMEKTRLALALIGKLNFTQLTEM
                                                                                                                                                                                                                                                                                                                                                                                                        DAAAIMEHILAGSSFMSHAK---KVNEMDPLLKPKQDRYALRTSPQWLGPQI-QVIRA-A
                                                                                                                                                                                                                                                                                                                                                                                                                          AIVNGTSVGSALAATVMFDANILAVLSEVLSAVFCEVMNGKPEYTDHLTHKL-KHHPGSI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         GLVNGTAVSASMATLALHDAHMLSLLSQALTALTVEAMVGHAGSFHPFLHDVTRPHPTQI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           TTASGDLVPLSYTAGLTTGRPNAQA-ISPDGRK--VDAABAFKLAGTEGGFFTLNPKEGL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           G-----HTLPSETVRAAMLVRINTLLQGYSGIRFEILEAITKLLNTGVTPCLPLRGT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              SFXLGRGLENSLPLEVVRGAMTIRVNSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGT
                                                                                                                                                                                                                                                                                                                                        TKSTEREVNSVNDNPVIDVHRGKALHGGNFOGTPIGVSMDNARLAIANIGKLMFAOFSEL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             ISASGDLSPLSYIAAAITGHPDSKVHVXHEGXEKIMXAREAIALFGLEP--VVLGPKEGL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            RXKIDKSVEFLRXQLXN--SVYGVTTGFGGSADTRTEDAISLQKALLEHQLCGVLFTSXD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                GAAAAEMAGSHLDEVKRMVAQ-FREPLVKIQGATLRVGQVAAVAQAKDAARVAVELDEEA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                GSXLPTTXXTQLDIVEXXLADPXTDDXXELDGYSLTLGDV--VGAARKGRXVRVXDSDEI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              RPRVKASSEWILTCIAHGGDIYGVTTGFGGTSHRRTKDGPALQVELLRHLNAGIFGTGSD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Conservative 116;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 28.5%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Score 958.5; DB 2; Pred. No. 2.1e-67;
 VFLTGEKLKSPGEECNKVFLGISQGKL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Mismatches
                                                                - APLCAAPGDRGRPRRRRQRTAPVANRIVES
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     #status predicted
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 266;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          for
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      a
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         phenylalanine
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   701;
 682
                                717
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Leu,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 71;
                                                                                                ALXYLSP
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CAG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          HOT
                                                                                                                                                                   626
                                                                                                                                                                                                                                                                                                                                                                      450
                                                                                                                                                                                                   537
                                                                                                                                                                                                                                                                                                     509
                                                                                                                                                                                                                                                                                                                                      417
                                                                                                                                                                                                                                                                                                                                                                                                                                                                          302
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         333
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           186
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              215
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                134
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              155
                                                                                                                                                                                                                                                                                                                                                                                                        357
                                                                                                                                                                                                                                                                                                                                                                                                                                          391
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             243
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             273
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                74
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  97
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          ammonia-lya
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 21
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        residue
```

RESULT

phenylalanine

ammonia-lyase

(EC

4.3.1.

. 5

loblolly

pine

```
В
                                       Ş
                                                                            밁
                                                                                                        8
                                                                                                                                       В
                                                                                                                                                               8
                                                                                                                                                                                                     밁
                                                                                                                                                                                                                               Ş
                                                                                                                                                                                                                                                              밁
                                                                                                                                                                                                                                                                                          Ś
                                                                                                                                                                                                                                                                                                                            맑
                                                                                                                                                                                                                                                                                                                                                      Ϋ́
                                                                                                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                                                                                                  5
                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       A;Description: catalyzes the deamination of L-phe C;Superfamily: histidine ammonia-lyase C;Keywords: ammonia-lyase; carbon-nitrogen lyase F;206-208/Cross-link: 5-imidazolinone (Ala-Gly) *
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               R; Zhang, X.H.; Chiang, V.L.
submitted to the EMBL Data Library, October 1995
A; Description: Nucleotide sequence of loblolly pine
A; Reference number: Z18847
A; Reference number: Z18847
A; Status: preliminary; translated from GB/EMBL/DDBJ
A; Molecule type: DNA
A; Residues: 1-754 < ZHA>
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        C;Species: Pinus taeda (loblolly pine)
C;Date: 16-Jul-1999 #sequence_revision 16-Jul-1999 #text_change 31-Jan-2000
C;Accession: T09779
R;Zhang, X.H.; Chiang, V.L.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     A; Gene: PAL
C; Function:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     A;Cross-references: EMBL:U39792; NID:g1143311; C;Genetics:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          ;207/Modified site: dehydroalanine
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Matches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Query Match
Best Local !
                 686
                                                                                                                                                                                                     525
                                                                                                                                                                                                                                    541
                                                                                                                                                                                                                                                                 465
                                                                                                                                                                                                                                                                                              481
                                                                                                                                                                                                                                                                                                                             405
                                             703
                                                                                                                                                                                                                                                                                                                                                         422
                                                                                                                                                                                                                                                                                                                                                                                                                                                    292
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 234
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              247
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             175
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        124
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       127
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  252;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   64
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 69
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Similarity
                EVIEVVYDAISEDKVIVPLFKCL
                                                                                                                                                                                                                                                           MASYTSELLYLANPVTSHVQSAEQHNQDVNSLGLVSARKSAEAIDILKLMLSTYLTALCQ
                                                                                                                                     YIDDPCNASYPLTQKLRNILVEHAFKNAEGEKDPNTSIFNKIPVFEAELK----AQLEPQ
                                                                                                                                                                                                                               AVDLRAMEFEFKKQFXPXXXXLLXQHFGXXXTXXXXXXELXXK-VXKXLXKRLEQTN---
                                                                                                                                                                                                                                                                                                                                                                                                             EGILRQDRYPLRTSPQWLGPLVSDMIHAHAVLSLEAGQSTTDNPLIDVENKXTHHGGNPQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                MFCEVMNGKPEFTDPLTHKL-KHHPGQMEAAAIMEYVLDGSSYMKHAAKLHEMNPLQKP-
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            IB--MSGAEALKKVGLEKPFELQPKEGLAIVNGTSVGAALASIVCFDANVLALLSEVISA
                                            SNVSRIYEAIKSGRINXVLVKML
                                                                                                        ISLTRXVRXXFWXAPSSSSPALXYLSP-RTRVLYSFVREELGVKARRGDVFLGKQEVTIG
                                                                                                                                                                                                AVDLRHLE----ENMLATVKQIVSQVAKKTLSTGLNGELLPGRFCEKDLLQVVDNEHVFS
                                                                                                                                                                                                                                                                                           AAAYTSELGHLANPVTTHVQPAEMGNQAVNSLALISARRTAEANDVLSLLLATHLYCVLQ
                                                                                                                                                                                                                                                                                                                         GTPIGVSMDNLRLSISAIGKLMFAQFSELVNDYYNGGLPSNLSGGPNPSLDYGLKGAEIA
                                                                                                                                                                                                                                                                                                                                                      ASAVXNIMEKTRIALALIGKINFTQLIEMINAGMNRGLPSCIA-AEDPSISYHCKGIDIA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                               LTVEAMVGHAGSFHPFLHDVTRPHPTQIEVARNIRTLLEGSXFAVH----HEEEVKVKDD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       YSGVRWDILETVEXLLNAWLTPKLPLRGTITASGDLVPLSYIAGLLTGRPNSRVR-SRDG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            HSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAITGHPDSKVHVXHEG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     SHRRTNQGAELQKELIRFLNAGV------LGKCPENVLSEDTTRAAMLVRTNTLLQG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 IEGKSLTISDVAAVARRSOVKVKLDAAAAKSRVEESSNWVLTOMTKGTDTYGVTTGFGAT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             LDGYSLTLGDVVGAARKGRXVRVXDSDEIRXKIDKSVEFLRXQLX--NSVYGVTTGFGGS
                                                                                                                                                                                                                                                                                                                                                                                     ----KQDRYGLRTSPQWLGPQVEIIRSATHMIEREI-NSVNDNPVIDVARDKALHGGNFQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         XEKIMXAREAIALEGLE-PVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLSQALTA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    ADTRTEDAISLOKALLEHOLCGVLPTSXDSFXLGRGLENSLPLEVVRGAMTIRVNSLTRG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Conservative
                                                                                                                                                                   -SYDLEPRWHD-----AFSXATGTVVEXLSSXXXXXVSLAAVNAWKVAXAEKA
                                                                         --SYDKGTSPLPDRIQECRSYPLYEFVRNQLGTK-----LLSGTRTISPG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            28.4%; Score 957; DB 2; Length 36.9%; Pred. No. 3.1e-67; Live 109; Mismatches 258; Inde
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      (Ser) #status predicted
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    L-phenylalanine to trans-cinnamic
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               PID:g1143312
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         pine phenylalanine ammonia-lyase gene,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       #status predicted
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            754;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             64;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         305
                                                                         685
                                                                                                                                     636
                                                                                                                                                                                                                                                                                                                                                        480
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      246
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   174
                                                                                                                                                                                                                                 596
                                                                                                                                                                                                                                                              524
                                                                                                                                                                                                                                                                                                                          464
                                                                                                                                                                                                                                                                                                                                                                                     404
                                                                                                                                                                                                                                                                                                                                                                                                                                                 349
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              291
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    186
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 123
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                361
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              126
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   RESULT 8
S48726
                     Ş
                                                       밁
                                                                                    Ş
                                                                                                                     片
                                                                                                                                                 Ş
                                                                                                                                                                                片
                                                                                                                                                                                                          Š
                                                                                                                                                                                                                                            뮍
                                                                                                                                                                                                                                                                      Ş
                                                                                                                                                                                                                                                                                                        멼
                                                                                                                                                                                                                                                                                                                                  Š
                                                                                                                                                                                                                                                                                                                                                                     В
                                                                                                                                                                                                                                                                                                                                                                                               Ş
                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                           Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      δÃ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              submitted to the EMBL Data
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              A; Molecule type: mRNA
A; Residues: 1-718 < APP1>
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      A; Accession: S56035
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   A; Cross-references: EMBL: X81159
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Matches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     госат
                                                                                                                     408
                                                                                                                                                  426
                                                                                                                                                                                349
                                                                                                                                                                                                               366
                                                                                                                                                                                                                                              291
                                                                                                                                                                                                                                                                           306
                                                                                                                                                                                                                                                                                                          233
                                                                                                                                                                                                                                                                                                                                      248
                                                                                                                                                                                                                                                                                                                                                                      174
                                                                                                                                                                                                                                                                                                                                                                                                    188
                                                                                                                                                                                                                                                                                                                                                                                                                               123
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             63
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       14
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    264;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Similarity
RHLEENLK--
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 28.4%;
```

```
A;Gene: PAL3
C;Superfamily: histidine ammonia-lyase
C;Keywords: ammonia-lyase; carbon-nitrogen lyase
C;Keywords: ammonia-lyase; carbon-nitrogen lyase
F;204-206/Cross-link: 5-imidazolinone (Ala-Gly) #status predicted
F;205/Modified site: dehydroalanine (Ser) #status predicted
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               A;Molecule type: mRNA
A;Residues: 1-58,'E',60-718 <APP2>
A;Cross-references: EMBL:X81159; NID:g535007; PIDN:CAA57057.1;
C;Genetics:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        A;Title: Structural and catalytic properties of the four phenylalanine A;Reference number: S48725; MUID:95010141; PMID:7925471 A;Accession: S48726
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             phenylalanine ammonia-lyase (EC 4.3.1.5) 3 - parsley C;Species: Petroselinum crispum (parsley) C;Date: 18-Oct-1995 #sequence revision 12-Apr-1996 #text_change C;Accession: S48726; S56035
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            R;Appert, C.; Logemann, E.; Hahlbrock, K.; Schmid, J.; Amrhein, Eur. J. Biochem. 225, 491-499, 1994
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             A;Status: nucleic acid sequence not shown
                                                      RAMEFEFKKQFXPXXXXLLXQHFGXXXTXXXXXXXELXXKV-----
                                                                                                                                                   TSELGHLANPVTTHVQPAEMGNQAVNSLALISARRTAEANDVLSLLLATHLYCVLQAVDL
                                                                                                                                                                                                                               GVSMDNTRLAIAAIGKLMFAQFSELVNDFYNNGLPSNLSGGRNPSLDYGFKGAEIAMASY
                                                                                                                                                                                                                                                                XNTMEKTRLALALIGKLNFTQLTEMLNAGMNRGLPSCLA-AEDPSLSYHCKGLDIAAAAY
                                                                                                                                                                                                                                                                                                                                                                                         RODRYPLRTSPOWLGPLVSDMIHAHAVLSLEAGOSTTDNPLIDVENKXTHHGGNFQASAV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            EKIMXAREAIALFGLEP--VVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLSQALTA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  SGIRFEILEAITKFLNHNITPCLPLRGTITASGDLVPLSYIAGLLTGRENSKA-VGPTGV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      SAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLSYIAAAITGHPDSKVHVXHEGX
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     TKQGGALQKELIRFLNAGI-----FGSGAEAGNNTLPHSATRAAMLVRINTLLQGY
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           NGXXNGXHAAXXASXXXXXXXXXXXAXAGSXLPTTXXTQLDIVEXXLADPXTDDXXELDGYS
                                                                                                                                                                                                                                                                                                                                            KODRYALRTSPOWLGPQI-EVIRSSTKMIEREINSVNDNPLIDVSRNKAIHGGNFQGSPI
                                                                                                                                                                                                                                                                                                                                                                                                                                                           IFAEVMQGKP-EFTDHLTHKLKHHPGQTEAAAIMEHILDGSAY-VKAAQKLHEMDPLQKP
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  LTVEAMVGHAGSFHPFLHDVTRPHPTQIEVARNIRTLLEGSXFAVHHEEEVKVKDDEGIL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     --TLSPEEAFKLAGVEGGFFELQPKEGLALVNGTAVGSGMASMVLFEANILAVLAEVMSA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           TEDAISLOKALLEHOLCGVLPTSXDSFXLGRGLE---NSLPLEVVRGAMTIRVNSLTRGH
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    LTISQVAAISARDDSGVKVELSEEARAGVKASSDWVMDSMNKGTDSYGVTTGFGATSHRR
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           LTLGDVVG-AARKGRXVRVXDSDEIRXKIDKSVEFLRXQLXNSV--YGVTTGFGGSADTR
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       NGTTNG-HANGNGLDLCMKKEDPLNWGVAAEALTGSHLDEVKRMVAE-YRKPVVKLGGET
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Library,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    114; Mismatches 286;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Score 955.5; DB 2
Pred. No. 3.8e-67;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  August 1994
STVKNTVSQVAKRVLTMGVNGELHPSRFCEKDLL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       DB 2;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 87;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       PID: g535008
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 16-Jul-1999
                                                         --XKXLX 589
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              ammonia-lyase
                                                                                                                                                                                                                                                                                     484
                                                                                                                                                                      544
                                                                                                                                                                                                                               467
                                                                                                                                                                                                                                                                                                                                            407
                                                                                                                                                                                                                                                                                                                                                                                                     425
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              187
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              130
                                                                                                                                                                                                                                                                                                                                                                                                                                                           348
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     365
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  305
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           232
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 247
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        173
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       122
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    62
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              73
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 180
```

Mon

DAFSXATGTVVEXLS

667 603 620

710 721 657 578

543

```
A;Cross-references: EMBL:X58180; NID:g19649; PIDN:CAA411
A;Experimental source: strain cv. Apollo
C;Genetics:
A;Genetics:
A;Gene: PALI
C;Superfamily: histidine ammonia-lyase
C;Superfamily: histidine ammonia-lyase
C;Keywords: ammonia-lyase; carbon-nitrogen lyase
F;211-213/Cross-link: 5-imidazolinone (Ala-Gly) #status
F;212/Modified site: dehydroalanine (Ser) #status predic
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       RESULT 9
$17444

C.Species: Medicago sativa (alfalfa)
C.Species: Medicago sativa (alfalfa)
C.Pate: 22-Nov-1993 #sequence_revision 10-Nov-1995 #text_change:
C.Accession: $17444
R.Gowri, G.; Paiva, N.L.; Dixon, R.A.
Plant Mol. Biol. 17, 415-429, 1991
A.Title: Stress responses in alfalfa (Medicago sativa L.). 12. Stress
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     nd developing plants.
A;Reference number: S17444; MUID:91355933;
A;Accession: S17444
A;Molecule type: mRNA
A;Residues: 1-725 <GOW>
                                                                              В
                                                                                                        8
                                                                                                                                               D,
                                                                                                                                                                           Ş
                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                              5
                                                                                                                                                                                                                                                                                        Вþ
                                                                                                                                                                                                                                                                                                                 Ş
                                                                                                                                                                                                                                                                                                                                                      Вb
                                                                                                                                                                                                                                                                                                                                                                                           8
                                                                                                                                                                                                                                                                                                                                                                                                                                  Вþ
                                                                                                                                                                                                                                                                                                                                                                                                                                                            8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 δ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              유 성
                                        8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Query Match
Best Local Similarity
Matches 262; Conserv
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    570
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   590
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             569
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               623
             449
                                              460
                                                                               389
                                                                                                                 400
                                                                                                                                                    336
                                                                                                                                                                                      345
                                                                                                                                                                                                                         277
                                                                                                                                                                                                                                                           285
                                                                                                                                                                                                                                                                                            220
                                                                                                                                                                                                                                                                                                                               227
                                                                                                                                                                                                                                                                                                                                                                 160
                                                                                                                                                                                                                                                                                                                                                                                                  167
                                                                                                                                                                                                                                                                                                                                                                                                                                      107
                                                                                                                                                                                                                                                                                                                                                                                                                                                                       109
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           48
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            49
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               AFEDELKALLPKEVETA-RAALESGNPAIPNRIKECRSYPLYKFVREELGT-----EYLT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           XAEKAIS--LTRXVRXXFWXAPSSSSPAL--XYLSPRTRVLYSFVREELGVKARRGDVFL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    RVVDREYIFAYIDDPCSATYPLMQKLRE----TLVEHALNNGDKERNLSTSIFQKIA
                                   PSCL-AAEDPSLSYHCKGLDIAAAAYTSELGHLANPVTTHVQPAEMGNQAVNSLALISAR
                                                                                                    STTDNPLIDVENKXTHHGGNFQASAVXNTWEKTRLALALIGKLNFTQLTEMLNAGMNRGL
                                                                                                                                                                                                                                                           MATLALHDAHMLSLLSQALTALTVEAMVGHAGSFHPFLHDVTRPHPTQIEVARNIRTLLE
                                                                                                                                                                                                                                                                                              YIAGLLTGRPNSK---AHGPSGEVLNAKEAFNLAGINAEFFELQPKEGLALVNGTAVGSG
                                                                                                                                                                                                                                                                                                                              YIAAAITGHPDSKVHVXHEGXEKIMXAREAIALFGL--EPVVLGPKEGLGLVNGTAVSAS
                                                                                                                                                                                                                                                                                                                                                               LPKTATRAAMLVRINTLLQGYSGIDFEILEAITKPLNKTVTPCLPLRGTITASGDLVPLS
                                                                                                                                                                                                                                                                                                                                                                                             LPLEVVRGAMTIRVNSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPLS
                                                                                                                                                                                                                                                                                                                                                                                                                                      MESMNKGTDSYGVTTGFGATSHSRTKQGGALQKELIRFLNAGIFGNGTES-----NHT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                     RXQLXNSV--YGVTTGFGGSADTRTEDAISLQKALLEHQLCGVLPTSXDSFXLGRGLENS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       SHLDEVKRMVAE-YRKPVVRLGGETLTISQVAAIAAHDHGVQVDLSESARDGVKASSEWV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          TOLDIVEXXLADPXTDDXXELDGYSLTLGDVVGAARKGRXVRVXDSDEIRXKIDKSVEFL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            GEKVRSPGEEFEKVFTAMSKGEIIDPLLECL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           GKQEVTIGSNVSRIYEAIKSGRINXVLVKML
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     KRLEQ---
           PSNLSASRNPSLDYGFKGAEIAMASYCSELQYLANPVTTHVQSAEQHNQDVNSLGLISAR
                                                                                 SVNDNPLIDVSRNKALHGGNPQGTPIGVSMDNTRLALASIGKLMFAQFSELVNDFYNNGL
                                                                                                                                                    GSSYVKAAKKLHEIDPLQKP-----KODRYALRTSPQWLGPLVE--VIRFSTKSIEREIN
                                                                                                                                                                                    GSXFAVH----HEEEVKVKDDEGILRODRYPLRTSPQWLGPLVSDMIHAHAVLSLEAG-Q
                                                                                                                                                                                                                       LASIVLFBANILAVLSEVLSAIFAEVMOGKP-BFTDHLTHKLKHHPGOIBAAAIMEHILD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Conservative 106;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            28.4%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     --TNSYDLEPRWHDAFSXATGTVVEXLSSXXXXXVSLAAVNAWKVA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Score 954; DB 2;
Pred. No. 5.1e-67;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Mismatches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            PMID:1715786
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           PIDN: CAA41169.1;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              707
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               725
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               status predicted predicted
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Length 725;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         PID:g19650
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               104;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Sequence analysis
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       16-Jul-1999
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Gaps
                                                  518
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  676
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    694
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       622
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       638
                                                                                   448
                                                                                                                     459
                                                                                                                                                      388
                                                                                                                                                                                          399
                                                                                                                                                                                                                             335
                                                                                                                                                                                                                                                             344
                                                                                                                                                                                                                                                                                                276
                                                                                                                                                                                                                                                                                                                                 284
                                                                                                                                                                                                                                                                                                                                                                     219
                                                                                                                                                                                                                                                                                                                                                                                                      226
                                                                                                                                                                                                                                                                                                                                                                                                                                          159
                                                                                                                                                                                                                                                                                                                                                                                                                                                                           166
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              106
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                108
                508
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    of.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  pher
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        phenylalanine ammonia-lyase (EC 4.3.1.5) 2 - C;Species: Petroselinum crispum (parsley) C;Date: 28-Oct-1995 #sequence_revision 10-Nov C;Accession: S48725 R;Appert, C.; Logemann, E.; Hahlbrock, K.; Scleur, J. Biochem. 225, 491-499, 1994
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  RESULT
S48725
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              A;Gene: PAL2
G;Superfamily: histidine ammonia-lyase
G;Superfamily: histidine ammonia-lyase
G;Keywords: ammonia-lyase; carbon-nitrogen lyase
G;202-204/Cross-link: 5-imidazolinone (Ala-Gly) #status predicted
F;203/Modified site: dehydroalanine (Ser) #status predicted
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 A;Status: nucleic acid sequence not shown A;Molecule type: mRNA A;Residues: 1-716 <APP>
                                                                                                                                                                                                                                                                                                                                                                                                      밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    A; Cross-references:
C; Genetics:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        A, Title: Structural and catalytic properties of A, Reference number: S48725; MUID:95010141; PMID
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              망
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   맑
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  δ
                                                                               Ş
                                                                                                                                                                                                                         Ś
                                                                                                                                                                                                                                                              片
                                                                                                                                                                                                                                                                                          Ś
                                                                                                                                                                                                                                                                                                                                 片
                                                                                                                                                                                                                                                                                                                                                             δ
                                                                                                                                                                                                                                                                                                                                                                                                                                    Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       A; Accession: S48725
                                                맑
                                                                                                                       밁
                                                                                                                                               Š
                                                                                                                                                                                        망
                á
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Query Match
                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Matches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    10
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Local
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        722
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             658
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               899
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                604
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    621
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     544
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         519
                  404
                                                    326
                                                                                                                       267
                                                                                                                                                        284
                                                                                                                                                                                          210
                                                                                                                                                                                                                                                                150
                                                                                                                                                                                                                                                                                                  166
                                                                                                                                                                                                                                                                                                                                                                        108
                                                                                                                                                                                                                                                                                                                                     99
                                                                                                                                                                                                                                                                                                                                                                                                        40
                                                                                                                                                                                                                                                                                                                                                                                                                                        49 TQLDIVEXXLADPXTDDXXELDGYSLTLGDVVG-AARKGRXVRVXDSDEIRXKIDKSVEF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                             254;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Similarity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          TECL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            VKML
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        RTAEANDVLSLLLATHLYCVLQAVDLRAMEFEFKKQFXPXXXXXLLXQHFGXXXXXXXXX
                                                                                                                                                                                          SYTAGLLTGRPNSKA-VGPTGV--ILSPEBAFKLAGVEGGFFELQPKEGLALVNGTAVGS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             --PNKINGCRSYPLYKFVREELGT-----GLLTGENVISPGEECDKLFSAMCQGKIIDPL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 LSP----
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Q---VLVDHALVNGESEKNFNTSIFQKIATFEEELKTLLPKEVESA-RTAYESGNPTI--
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  SXXXXXVSLAAVNA------WKVAXAEKAIS--LTRXVRXXFWXAPSSSSPALXY
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     SVKNTVSQVAKKTLTMGVNGELHPSRFCEKDLLKVVDREHVFAYIDDPCSATYPLSQKLR
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          KTNEAIEILQLMSSTFLIALCQAIDLRHLEENLKN--
                  NPLIDVENKXTHHGGNFQASAVXNTMEKTRLALALIGKLNFTQLTEMLNAGMNRGLPSCL
                                                                                                                        GMASMVLFEANILAVLAEVMSAIFAEVMQGKP-EFTDHLTHKLKHPGQIEAAAIMEHIL
                                                                                                                                                      SMATLALHDAHMLSLLSQALTALTVEAMVGHAGSFHPFLHDVTRPHPTQIEVARNIRTLL
                                                                                                                                                                                                                               SYIAAAITGHPDSKVHVXHEGXEKIMXAREAIALFGLEP--VVLGPKEGLGLVNGTAVSA
                                                                                                                                                                                                                                                                TLPHSATRAMATUTLLQGYSGIRFEILEAITKFLNQNITPCLPLRGTITASGDLVPL
                                                                                                                                                                                                                                                                                                SLPLEVVRGAMTIRVNSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPL
                                                                                                                                                                                                                                                                                                                                                                       LRXQLXNSV--YGVTTGFGGSADTRTEDAISLQKALLEHQLCGVLPTSXDSFXLGRGLEN
                                                                                                                                                                                                                                                                                                                                                                                                          SHLDEVKKMVAE-YRKPVVKLGGETLTISQVAAISARDGSGVTVELSEAARAGVKASSDW
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        ELXXKVXKXLXKRLEQTNSYDLEP - - -
                                                  DĠŚĄY-VKĄĄCKLHEMDPLOKPKÓDRYĄLRTŚPÓWLGPOI-EVIRSSTKMIEREINŚVNO
                                                                                   EGSXFAVHHEEEVKVKDDEGILRQDRYPLRTSPQWLGPLVSDMIHAHAVLSLEAGQSTTD
                                                                                                                                                                                                                                                                                                                                     VMDSMNKGTDSYGVTTGFGATSHRRTKQGGALQKELIRFLNAGI-----FGNGSDN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            714
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      EMBL:X81158; NID:g534892;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             -RTRVLYSFVREELGVKARRGDVFLGKQEVTIGSNVSRIYEAIKSGRINXVL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                             28.1%; Score 946.5; DB 2 35.5%; Pred. No. 1.9e-66; tive 110; Mismatches 264
10-Nov-1995 #text_change
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              es of the four phenylalanine PMID:7925471
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Schmid, J.; Amrhein,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   parsley
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          PIDN:CAA57056.1;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                DB 2;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 264;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          -RWH----
                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Length
```

716;

87;

Gaps

19

107

98

165

149

225

209

403

463

343 266 283

325

PID:g534893

16-Jul-1999

z

ammonia-lyase

μ.

뫄 S

S

S 문 Ś 밁 8

밁

```
A; Molecule type: DNA
A; Residues: 1-716 < LOI>
A; Cross-references: EMBL:X15473
C; Genetics:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     RESULT 11
S04463
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    A;Title: A phenylalanine ammonia-lyase gene from parsley: structure, A;Reference number: S04463; MUID:89356635; PMID:2767049 A;Accession: S04463
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       phenylalanine ammonia-lyase (EC 4.3.1.5) - parsley C;Species: Petroselinum crispum (parsley) C;Date: 04-Dec-1992 #sequence_revision 04-Dec-1992 C;Accession: $04463
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         R;Lois, R.; Dietrich, A.; Hahlbrock, EMBO J. 8, 1641-1648, 1989
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      ;Keywords: ammonia-lyase; carbon-nitrogen lyase;202-204/Cross-link: 5-imidazolinone (Ala-Gly) #status predicted;203/Modified site: dehydroalanine (Ser) #status predicted
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Superfamily: histidine ammonia-lyase
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 ;Introns: 136/2
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Query Match
Best Local
     404
                                                                                                                                                                                                                                             210
                                                                                                                                                                                                                                                                                                                                           150
                                                                                                                                                                                                                                                                                                                                                                                         166
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     108
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               504
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          384
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    254;
                                                                                                                                                                                                                                                                                                                                                                                                                                       99
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      40
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    49
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Similarity
  NPLIDVENKXTHHGGNFQASAVXNTMEKTRLALALIGKLNFTQLTEMLNAGMNRGLPSCL
                                                                                                                                                                                          SMATLALHDAHMLSLLSQALTALTVEAMVGHAGSFHPFLHDVTRPHPTQIEVARNIRTLL
                                                                                                                                                                                                                                                                                                                                         TLPHSATRAAMLVRINTLLOGYSGIRFEILEAITKFLNQNITPCLPLRGTITASGDLVPL
                                                                                                                                                                                                                                                                                                                                                                                       SLPLEVVRGAMTIRVNSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDLSPL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   LRXQLXNSV--YGVTTGFGGSADTRTEDAISLQKALLEHQLCGVLPTSXDSFXLGRGLEN 165
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      SHLDEVKMVAE-YRKPVVKLGGETLTISQVAAISARDGSGVTVELSEAARAGVKASSDW
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               TQLDIVEXXLADPXTDDXXELDGYSLTLGDVVG-AARKGRXVRVXDSDEIRXKIDKSVEF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             RTRVLYSFVREELGVKARRGDVFLGKQEVTIGSNVSRIYEAIKSGRINXVLVKML
                                             DGSAY-VKAAQKLHEMDPLQKPKQDRYALRTSPQWLGPQI-EVIRSSTKMIEREINSVND
                                                                                              EGSXFAVHHEEEVKVKDDEGILRQDRYPLRTSPQWLGPLVSDMIHAHAVLSLEAGQSTTD
                                                                                                                                            GMASMVLFEANTLAVLAEVMSATFAEVMQGKP-EFTDHLTHKLKHHPGQTEAAAIMEHTL
                                                                                                                                                                                                                                             SYIAGLLTGRPNSKA-VGPTGV--ILSPEEAFKLAGVEGGFFELQPKEGLALVNGTAVGS
                                                                                                                                                                                                                                                                                      SYIAAAITGHPDSKVHVXHEGXEKIMXAREAIALFGLEP--VVLGPKEGLGLVNGTAVSA
                                                                                                                                                                                                                                                                                                                                                                                                                                     VMDSMNKGTDSYGVTTGFGATSHRRTKQGGALQKELIRFLNAGI-----FGNGSDN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    RSYPLYKFVRKELGI-----EYLTGEKVTSPGEEFDKVFIAMSKGEIIDPLLECL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              EXLSSXXXXXVSLAAVNAWKVAXAEKAISLTRXVRXXFWXAPSSSSPALXYLSP-----
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              KDLLRFVDREYIFAYIDDPCSATYPLMQKLRQTLVEHALKNGDNERNMNTSIFQKIATFE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            XELXXKVXKX-------LXKRLEQT-----NSYDLEPRWHDAFSXATGTVV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             AVEILKLMSTTFLVGLCQAIDLRHLEENLKSTVKNTVSSVAKRVLTMGVNGELHPSRFCE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           ANDVLSLLLATHLYCVLQAVDLRAMEFEFKKQFXPXXXXLLXQHF----GXXXTXXXXX
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         SGGRNPSLDYGFKGAEIAMASYCSELQFLANPVINHVQSAEQHNQDVNSLGLISSRKTSE 503
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       A-AEDPSLSYHCKGLDIAAAAYTSELGHLANPVTTHVQPAEMGNQAVNSLALISARRTAE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    NPLIDVSRNKAIHGGNFQGTPIGMSMDNTRLAIAAIGKLMFAQFSELVNDFYNNGLPSNL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         28.1%; Score 946.5; DB 2 36.7%; Pred. No. 1.9e-66;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    110;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                ALLPKEVESAR-----AALESGNPAI----PNRIEEC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Mismatches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                K.; Schulz,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                DB 2;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Σ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                #text
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              _change
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                716;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  43;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                21-May-1999
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               regulation
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    725
                                                                                              403
                                                                                                                                              325
                                                                                                                                                                                                                                          266
                                                                                                                                                                                                                                                                                        283
                                                                                                                                                                                                                                                                                                                                         209
                                                                                                                                                                                                                                                                                                                                                                                    225
                                                                                                                                                                                                                                                                                                                                                                                                                                     149
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   86
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              623
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            616
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  18;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  and iden
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              RESULT 12
S22991
                                                                                           밁
                                                                                                                                       Ś
                                                                                                                                                                                            밁
                                                                                                                                                                                                                                   Ş
                                                                                                                                                                                                                                                                                        밁
                                                                                                                                                                                                                                                                                                                                 Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        A;Introns: 131/2
C;Superfamily: histidine ammonia-lyase
C;Keywords: ammonia-lyase; carbon-nitrogen lyase
E;199-201/Cross-link: 5-imidazolinone (Ala-Gly) #status predicted
E;200/Modified site: dehydroalanine (Ser) #status predicted
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            DNA Seq. 1, 335-346, 1991
A;Title: Sequence and structure of a phenylalanine ammonia-lyase gene from Glycine max.
A;Reference number: S22991; MUID:92190550; PMID:1799682
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               phenylalanine ammonia-lyase (EC 4.3.1.5) 1 - soybean
C;Species: Glycine max (soybean)
C;Date: 06-Jan-1994 #sequence_revision 10-Nov-1995 #text_change 16-Jul-1999
                                   Ś
                                                                                                                                                                                                                                                                                                                                                                                    ß
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       A; Molecule type: DNA
A; Residues: 1-713 < FRA>
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    R; Frank, R.L.; Vodkin, L.O.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ó
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              A;Cross-references: EMBL:X52953; NID:g18376; PIDN:CAA37129.1; PID:g18377
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          A; Accession: S22991
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                C;Accession: S22991
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Genetics
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Matches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Best Local
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Query Match
                                             308
                                                                                                                                                                                            171
                                                                                                                                                                                                                                          190
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         623
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       641
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       564
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     583
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             384
                                                                                                                                                                                                                                                                                        120 KQGGALQKELIRFLNAGI-----FGNGTESSHTLPHTATRAAMLVRINTLLQGYSG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               271;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               444 SGGRNPSLDYGFKGAEIAMASYCSELQFLANFVTNHVQSAEQHNQDVNSLGLISSRKTSE 503
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             464 A-AEDPSLSYHCKGLDIAAAAYTSELGHLANPVTTHVQPAEMGNQAVNSLALISARRTAE 522
                                                                                                                                                                                                                                                                                                                                                                                    60 LTIAQVAAVAGHDHGVAVELSESAREGVKASSEWVMNSMNNGTDSYGVTTGFGATSHRRT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 14
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     ທ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Similarity
AEVMQGKP-EFTDHLTHKLKHHPGQIEAAAIMEHILDGSSYMKAAKKLHEIDPLQKP---
                                                                                                                                                                                                                                        VRLVVLEALTNELNHGITPIVPLRGTISASGDLSPLSYIAAAITGHPDSKVHVXHEGXEK
                                                                                                                                                                                                                                                                                                                                      EDAISLOKALLEHQLCGVLPTSXDSFXLGRGLENS--LPLEVVRGAMTIRVNSLTRGHSA 189
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              NGXXNGXHAAXXASXXXXXXXXXXAXAGSXLPTTXXTQLDIVEXXLADPXTDDXXELDGYS
                                                                                           VLNAKEAFELASINSEFFELQPKEGLALVNGTAVGSGLASMVLFEANILAVLSEVLSAIF
                                                                                                                                            IMXAREAIALFGL--EPVVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLSQALTALT
                                                                                                                                                                                                                                                                                                                                                                                                                                  LTLGDVVGAARKGRXVRVXDSDEIRXKIDKSVEFLRXQLXNSV--YGVTTGFGGSADTRT 131
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   NGHQNGSFCLSTAKGNNDPLNWGAAA----EAMKGSHLDEVKRMVAE-YRKPVVRLGGET
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             LTGEKVTSPGEEFEKVFIAMSKGEIIDPLLECL 705
                                           VEAMVGHAGSFHPFLHDVTRPHPTQIEVARNIRTLLEGSXFAVH----HEEEVKVKDDEG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           AVEILKLMSTTFLVGLCQAIDLRHLEENLKSTVKNTVSSVAKRVLTMGVNGELHPSRFCE
                                                                                                                                                                                            IRFEILEAITKLLNNNVTPCLDLRGTITASGDLVPLSYIAGLLTGRPNSKA-VGPSG--E
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        FLGKQEVTIGSNVSRIYEAIKSGRINXVLVKML
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         EDELKALLPKEVESA-RAALESGNPAI----PNRIEECRSYPLYKFVRKELGT-----EY
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       EXAIS--LTRXVRXXFWXAPSSSSPALXYLSP-----RTRVLYSFVREELGVKARRGDV 692
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     KDLLRVVDR-EY1FAY1DDPCSATYPLMQKLRQTLVEHALKNGDNERNLSTS1FQK1ATF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                KVXKXLXKRLEQTNSYDLEP--RWHDAFSXATGTVVEXLSSXXXXXVSLAAVNAWKVAXA 640
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            ANDVISILLATHIYCVIQAVDIRAMEFEFKKQFXPXXXXILXQHFGXXXTXXXXXXELXX 582
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Conservative 105;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        28.1%; Score 946; DB 2; 36.6%; Pred. No. 2.1e-66;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Mismatches 293;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           725
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Length 713;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 72;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Gaps
                                                                                                                                                                                                                                          249
                                                                                                                                                                                                                                                                                                                                                                                    119
                                                                                                                                            307
                                                                                                                                                                                                                                                                                        170
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         672
                                                                                              287
                                                                                                                                                                                            227
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   59
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   563
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   73
```

Ş

Š 망 Ş В S Ď, Ś B, 8 밁 Ş

밁

477

457

```
RESULT 13
S66343
                                                                                                                                                                                                                                                                                                                                                                A;Introns: 133/2
(C;Superfamily: histidine ammonia-lyase
C;Keywords: ammonia-lyase; carbon-nitrogen lyase
E;201-203/Cross-link: 5-inidazolinone (Ala-Gly) #status predicted
E;202/Modified site: dehydroalanine (Ser) #status predicted
                                                                                                                                             Вþ
                                                                                                                                                                                  Ş
                                          Ó
                                                                                   밁
                                                                                                           8
                                                                                                                                                                                                                           В
                                                                                                                                                                                                                                                 Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                      A; Gene: PAL1
                                                                                                                                                                                                                                                                                                                                                                                                                                                                      A; Cross-references: C; Genetics:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        당 성
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Дb
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        유 성
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  멍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 g
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           5
                                                                                                                                                                                                                                                                                                                                 Query Match
                                                                                                                                                                                                                                                                                                                Local
                224
                                                241
                                                                                   164
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             682
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               628
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 647
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    577
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    000
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       520
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       542
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          460
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           482
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               400
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  423
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   344
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     364
                                                                                                                      181
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            705
                                                                                                                                                                                                                           53
                                                                                                                                                                                                                                                              8
6
                                                                                                                                                                                                                                                                                                                Similarity
                                          HVXHEGXEKIMXAREAIALFGLEP--VVLGPKEGLGLVNGTAVSASMATLALHDAHMLSL
                                                                                                                                                                                                                                                      ELDGYSLTLGDVVGAA---RKGRXVRVXDSDEIRXKIDKSVBFLRXQLXNSV--YGVTTG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       VDLRAMEFEFKKQFXPXXXXLLXQHFGXXXTXXXXXXELXXKVXKXLXKRL--EQTNSYD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             TPIGVSMDNTRLALASIGKLMFAQFSELVNDFYNNGLPSNLTASRNPSLDYGFKGAEIAM
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   --KODRYALKTSPOWLGPLIE--VIRFSTKSIEREINSVNDNPLIDVSKNKALHGGNFOG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             ILRQDRYPLRTSPQWLGPLVSDMIHAHAVLSLEAG-QSTTDNPLIDVENKXTHHGGNFQA
              - VGPNG--ETLNAESAFRVAGVNGGFFELQPKEGLALVNGTAVGSGMASMVLFDSNILAV
                                                                                     NTLLQGYSGIRFEILEAITKLINSNITPCLPLRGTITASGDLVPLSYIAGLLTGRPNSKA
                                                                                                      NSLTRGHSAVRLVVLEALTNFLNHGITEIVPLRGTISASGDLSPLSYIAAAITGHPDSKV
                                                                                                                                                        FGATSHRRTKNGGALQKELIRFLNAGV
                                                                                                                                                                                     FGGSADTRTEDAISLOKALLEHOLOGVLFTSXDSFXLGRGLENS--LPLEVVRGAMTIRV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             FOKLFTAMCQGKIIDPLMECL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            VSRIYEAIKSGRINXVLVKML 725
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              PKEVEGA-RAAYESGKAAIPNKIQECRSYPLYKFVREELGT----
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 TRXVRXXFWXAPSSSSPAL --XYLSPRTRVLYSFVREELGVKARRGDVFLGKQEVTIGSN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    DDP-----CSATYPLMQKLRQ---VLVDHALVNAECEKDVNSSIFQKIAIFEEELKNLL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      LEPRWHDAFSXATGTVVEXLSSXXXXXVSLAAVNA------WKVAXAEKAIS--L
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          ASYCSELQYLANDVTTHVQSAEQHNQDVNSLGLISSRKTNEAIEILKLMSSTFLIALCQA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         AAYTSELGHLANPVTTHVQPAEMGNQAVNSLALISARRTAEANDVLSLULATHLYCVLQA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              SAVXNTMEKTRIALALIGKINFTQLTEMINAGMNRGLPSCI-AAEDPSISYHCKGLDIAA
                                                                                                                                                                                                                           KLGGESLTVAQVAAIAVRDKSANGVKVELSEEARAGVKASSDWVMDSMNKGTDSYGVTTG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       IDLRHLEENLKNSVKNTVSQVSKR----ILTTGVNGELHPSRFCEKDLLKVVDREYIFSYI
                                                                                                                                                                                                                                                                                               Conservative
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         EMBL: M84466; NID: g170349;
                                                                                                                                                                                                                                                                                                              28.0%;
                                                                                                                                                                                                                                                                                               107;
                                                                                                                                                                                                                                                                                                                Score 943; DB 2; Pred. No. 3.7e-66;
                                                                                                                                                                                                                                                                                               Mismatches 254;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           PIDN: AAA34122.1;
                                                                                                                                                          - FGNGTETSHTLPHSATRAAMLVRI
                                                                                                                                                                                                                                                                                                                               Length 715;
                                                                                                                                                                                                                                                                                                 Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 -GLLTGEKVRSPGEE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           PID:g170350
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      16-Jul-1999
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 and evolution in
                                                                                                                                                                                                                                                                                               Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               541
                                                  298
                                                                                                                      240
                                                                                                                                                          163
                                                                                                                                                                                           180
                                                                                                                                                                                                                            112
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 681
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   704
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    627
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       646
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         576
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        599
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            519
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                459
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  481
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     399
                  280
                                                                                     223
                                                                                                                                                                                                                                                              122
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Nicot:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          phenylalanine ammonia-lyase (EC 4.3.1.5) 2 [simila N,Alternate names: protein T4D2.190 C;Species: Arabidopsis thaliana (mouse-ear cress) C,Date: 04.Feb-2000 #sequence_revision 04-Feb-2000 C;Accession: T46172; S52991 Dauner, D.; Sterr, submitted to the Protein Sequence Database, Decemb A,Reference number: Z23025
                                                                                                                                                                                                                                                                                                                                                              A; Molecule type: DNA
A; Residues: 1-717 < NYA>
A; Residues: 1-717 < NYA>
A; Residues: 1-717 < NYA>
A; Cross-references: EMBL: AL132958; NID: 96434245; PIDN: CAB64229.1; PI
A; Experimental source: cultivar Columbia; BAC clone T4D2
A; Experimental source: cultivar Columbia; BAC clone T4D2
R; Wanner, L.A.; Li, G.; Ware, D.; Somssich, I.E.; Davis, K.R.
Plant M01. Biol. 27, 327-338, 1995
Plant M01. Biol. 27, 327-338, 1995
A; Title: The phenylalanine ammonia-lyase gene family in Arabidopsis
A; Reference number: S52990; MUID: 95195160; PMID: 7888622
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  RESULT
T46172
                                                                                                                                                        A; Note: T4D2.190
C; Superfamily: hi
                                                                                                                                                                                                                                             A;Note: the nucleotide sequence was submitted to the EMBL Data C;Genetics:
                                                                                                                                                                                                                                                                               A;Residues: 1-205,'H',207-234,'E',236-717 <WAN>A;Cross-references: EMBL:L33678; NID:g497420; P
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   日
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        문
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           뮹
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             믕
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               á
8
                                                                                                                                                                                                          A; Map position:
                                                                                                                                                                                                                                                                                                 A; Molecule type: DNA
A; Residues: 1-205, 'H
                                                                                                                                                                                                                                                                                                                                 A; Status: nucleic acid sequence not shown;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          A; Reference number:
A; Accession: T46172
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          뮍
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             片
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    음 · 청
                                                                                                                                                                                             A; Introns: 135/2
                                                                                                                                                                                                                                A;Gene: PAL2
                                                                                                      ;Keywords: ammonia-lyase; carbon-nitrogen lyase
;203-205/Cross-link: 5-imidazolinone (Ala-Gly) #status
;204/Modified site: dehydroalanine (Ser) #status predi
                                     Matches
                                                                                                                                                        Superfamily: histidine ammonia-lyase
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     14
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          670
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             628
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     588
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        538
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           458
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              398
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                419
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    281 MSEVISAIFAEVMNGKP-EFTDHITHKLKHHPGQIEAAAIMEHILDGSSY-VKAAQKIHE 338
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       299
   49
                                                   Similarity
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        LCQAIDLRHLEENLKNAVKNTVSQVAKRTLTMGANGELHPARFCEKELLRIVDREYLFAY
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        VLQAVDLRAMEFEFKKQFXPXXXXLLXQHF-----GXXXTXXXXXXXELXXKVXKX-----
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           DIAAAAYTSELGHLANPVTTHVQPAEMGNQAVNSLALISARRTAEANDVLSLLLATHLYC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      NFQASAVXNTMEKTRLALALIGKLNFTQLTEMLNAGMNRGLPSCL-AAEDPSLSYHCKGL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       LSOALTALTVEAMVGHAGSFHPFLHDVTRPHPTQIEVARNIRTLLEGSXFAVHHEEEVKV
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          GDVFLGKQEVTIGSNVSRIYEAIKSGRINXVLVKML
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               VNAWKVAXAEKAISLTRXVRXXFWXAPSSSSPAL--XYLSPRTRVLYSFVREELGVKARR
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  ADDPCSCNYPLMQKLRQVLVDHAMNNGESEKNVNSSIFQKIGAFED---
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              NFQGTPIGVSMDNARLALASIGKLMFAQFSELVNDYYNNGLPSNLTASRNPSLDYGFKGA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 MDPLQXPKQDRYALRTSPQWLGPQI-EVIRAATKMIEREINSVNDNPLIDVSRNKALHGG
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       KDDEGILRQDRYPLRTSPQWLGPLVSDMIHAHAVLSLEAGQSTTDNPLIDVENKXTHHGG
   TQLDIVEXXLADPXT---
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          -ELLTGEKVRSPGEECDKVFTAMCNGQIIDPMLECL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     ------LXKRLEQT-----NSYDLEPRWHDAFSXATGTVVEXLSSXXXXXVSLAA
                                     Conservative
                                                   27.9%;
                                   122;
                                                   Score 939.5;
Pred. No. 6.9
                                     Mismatches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               -ear cress)
04-Feb-2000 #text_change 04-Mar-2000
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   -ESGNPAIPNRITECRSYPLYRFVRKELGT----
                                                                                                                                                                                                                                                                                                                                    translation
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     [similarity]
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 December
                                                     .9e-66;
                                                                    DB 2;
                                                                                                                          #status predicted
                                      262;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   W.; Holland,
ber 1999
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            704
                                                                                                                                                                                                                                                                                                                                      not shown
                                      Indels
                                                                      Length
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ı
                                                                                                                                                                                                                                                            71.1; PID:g497421
Data Library, June 1994
     -LDGYSLTLGDVVGAAR
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Arabidopsis
```

۲۵ :

Weichselgartner,

Z

thaliana

--ELKA

627

631 577 537

587 517

689

PID:g6630746

**;** 66

Gaps

```
phenylalanine ammonia-lyase (EC 4.3.1.5) - common tobacco
C;Species: Nicotlana tabacum (common tobacco)
C;Date: 24-Mar-1999 #sequence_revision 24-Mar-1999 #text_change 16-
C;Accession: T03663
R;Pellegrini, L.; Rohfritsch, O.; Fritig, B.; Legrand, M.
Plant Physiol. 106, 877-886, 1994
A;Title: Phenylalanine ammonia-lyase in tobacco. Molecular cloning
A;Reference number: Z14995; MUID:95125127; PMID:7824656
A;Accession: T03663
A;Bccession: T03663
A;Accession: T03663
                                                                     A; Gene:
C; Functi
C;Function:
A;Description: catalyzes the deamination of L-phenylalanine
A;Note: strongly induced during the hypersensitive reaction
                                                                                                               A;Cross-references: EMBL:X78269; NID:g633596; PIDN:CAA55075.1; PID:g633597 A;Experimental source: cultivar Samsun NN; tissue-type leaves after infection C;Genetics:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                         RESULT 15
T03663
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  В
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      당
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ₽.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                $
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  693
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        597
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             476
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          494
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 376
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               304
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            321
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                203
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         143
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 15
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  MCEGKLIDPLMDCL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              IKSGRINXVLVKML
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        HLTHRLKHHPGQTEAAAIMEHILDGSSYMKLAQKVHEMDPLQKP-----KQDRYALRTS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        ARAAYGNGTAPIPNRIKECRSYPLYRFVREELGTK-----LLTGEKVVSPGEEFDKVFTA 692
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       XFWXAPSSSSPALXYLSP-RTRVLYSFVREELGVKARRGDVFLGKQEVTIGSNVSRIYEA 711
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    TYVDDPCSATYPLMQRLRQVIVDHALSNGETEXNAVTSIFQKIGAFEEELKAVLPKEVEA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                SYDLEP--RWHDAFSXATGTVVEXLSSXXXXXVSLAAVNAWKVAXAEKAIS--LTRXVRX
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            PVTSHVQSAEQHNQDVNSLGLISSRKTSEAVDILKLMSTTFLVGICQAVDLRHLEENLRQ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  PVTTHVQPAEMGNQAVNSLALISARRTAEANDVLSLLLATHLYCVLQAVDLRAMEFEFKK
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    ATAATGKLMFAQFSELVNDFYNNGLPSNLTASSNPSLDYGFKGAETAMASYCSELQYLAN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                ALALIGKLNFTQLTEMLNAGMNRGLPSCL-AAEDPSLSYHCKGLDIAAAAYTSELGHLAN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               POWLGPOIE -- VIRQATKSIEREINS VNDNPLIDVSRNKAIHGGNFQGTPIGVSMDNTRL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         PQWLGPLVSDMIHAHAVLSLEAG-QSTTDNPLIDVENKXTHHGGNFQASAVXNTMEKTRL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       FLHDVTRPHPTQIEVARNIRTLLEGSXF-----AVHHEEEVKVKDDEGILRQDRYPLRTS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    STGFFDLOFKEGLALVNGTAVGSGMASMYLFEANVQAVLAEVLSAIFAEVMSGKP-EFTD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                EP--VVLGPKEGLGLVNGTAVSASMATLALHDAHMLSLLSQALTALTVEAMVGHAGSFHP 320
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         NHGITPIVPLRGTISASGDLSPLSYIAAAITGHPDSKVHVXHEGXEKIMXAREAIALFGL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        RFLNAGIFGNTKETC-----HTLPQSATRAAMLVRVNTLLQGYSGIRFEILEAITSLL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  EHQLCGVLPTSXDSFXLGRGLENSLPLEVVRGAMTIRVNSLTRGHSAVRLVVLEALTNFL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   VGGSVKVELAETSRAGVKASSDWVMESMNKGTDSYGVTTGFGATSHRRTKNGTALQTELI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     NHNISPSLPLRGTITASGDLVPLSYIAGLLTGRPNSKA-TGPDG--ESLTÄKEÄFEKÄGI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                KGRXVRVXDSDEIRXKIDKSVEFLRXQLXNSV--YGVTTGFGGSADTRTEDAISLQKALL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  706
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             -TVKNTVSQVAKKVLTTGINGELHPSRFCEKDLLKVVDREQVF
                   to trans-cinnamic
to TMV or to a fur
                                                                                                                                                                                                                                                                                                                                                                                                 16-Jul-1999
                                                                                                                                                                                                                                                                                                   and
                                                                                                                                                                                                                                                                                                   gene expression
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     553
                 fungal
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      637
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               577
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    475
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                493
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               415
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            434
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           357
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       375
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    303
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               244
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        187
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   134
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            74
                                                                                                                                     γď
                      elicit
```

```
C;Superfamily: histidine ammonia-lyase C;Superfamily: histidine ammonia-lyase C;Keywords: ammonia-lyase; carbon nitrogen lyase F;198-200/Cross-link: 5-imidazolinone (Ala-Gly) #status predicted F;199/Modified site: dehydroalanine (Ser) #status predicted
                                 Ş
                                                                       밁
                                                                                                          Ś
                                                                                                                                                        밁
                                                                                                                                                                                       5
                                                                                                                                                                                                                                   Ъ
                                                                                                                                                                                                                                                                       Š
                                                                                                                                                                                                                                                                                                                   밁
                                                                                                                                                                                                                                                                                                                                                  δ
                                                                                                                                                                                                                                                                                                                                                                                              B
                                                                                                                                                                                                                                                                                                                                                                                                                             Š
                                                                                                                                                                                                                                                                                                                                                                                                                                                                         맑
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Ś
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              맑
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Ş
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          밁
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Matches 253;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Query Match
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Local
                                                                             592
649
                                                                                                                                                                                                                                       497
                                                                                                                                                                                                                                                                                                                   437
                                                                                                                                                                                                                                                                                                                                                        461
                                                                                                                                                                                                                                                                                                                                                                                                377
                                                                                                                                                                                                                                                                                                                                                                                                                                      401
                                                                                                                                                                                                                                                                                                                                                                                                                                                                           319
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 341
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           260
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              281
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    107
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            ω
ω
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               49 TOLDIVEXXLADPXTDDXXELDGYSLTLGDVVGAARK--GRXVRVXDSDEIRXKIDKSVE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Similarity
KECRSYPLYRFVREELG----AELLTGEKVRSPGEECDKVFTAMCNGQIIDSLLECL
                                                                                                                                                        VKNTVSQVAKRTLTMGANGELHPSRFCEKDLLRVVDREYVFRYADDACSANYPLMQKLRQ 591
                                                                                                                                                                                              LXXKVXKXLXKRLEQTNSYDLEP------RWHDAFSXATGTVVEXLSS
                                                                                                                                                                                                                                                                                                                                                                                          VNDNPLIDVSRNKALHGGNFOGTPIGVSMDNARLALASIGKLMFAQFSELVNDYYNNGLP
                                                                                                                                                                                                                                                                                                                                                                                                                                                                         HILDGSSY-VKAPQKLHETDPLQKPKQDRYALRTSPQWLGPQIEVIRSATKMIEREI-NS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 SCHTLPQSGTRAAMLVRINTLLQGYSGIRFEILEAITKLLNHNVTPCLPLRGTITASGDL
                                   ---RTRVLYSFVREELGVKARRGDVFLGKQEVTIGSNVSRIYEAIKSGRINXVLVKML
                                                                                                                                                                                                                                                                       ŢĄĘĄNDVĻSĻLLĄTHĻYCVLQĄVDĻŖAMEFEFKKQFXPXXXXLLXQHFGXXXTXXXXXXE 579
                                                                                                                                                                                                                                                                                                                                              SCL-AAEDPSLSYHCKGLDIAAAAYTSELGHLANPVTTHVQPAEMGNQAVNSLALISARR
                                                                                                                                                                                                                                                                                                                                                                                                                           TTDNPLIDVENKXTHHGGNFQASAVXNTMEKTRLALALIGKLNETQLTEMLNAGNNRGLP 460
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               TLLEGSXFAVHHEEEVKVKDDEGILRQDRYPLRTSPQWLGPLVSDMIHAHAVLSLEAGQS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   SPLSYIAAAITGHPDSKVHVXHEGXEKIMXAREAIALFGLEP--VVLGFKEGLGLVNGTA
                                                                         ---VLVDHALENGENEKNANSSIFQKILAFEGELKAVLPKEVESARISLENGNPAIANRI 648
                                                                                                                                                                                                                                   TAEAVDILKLMSSTYLVALCQAIDLRHLEENLRN-----
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            VSASMATLALHDAHMLSLLSQALTALTVEAMVGHAGSFHPFLHDVTRPHPTQIEVARNIR 340
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          --NSLPLEVVRGAMTIRVNSLTRGHSAVRLVVLEALTNFLNHGITPIVPLRGTISASGDL
                                                                                                                XXXXXVSLAAVNAWKVAXA-----EKAISLTRXVRXXFWXAPSSSSPALXYLSP-----
                                                                                                                                                                                                                                                                                                                   SNLTAGRNPSLDYGFKGSEIAMASYCSELQFLANPVINHVQSAEQHNQDVNSLGLISARK 496
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      VGSGLASMVLFDANILAVFSEVLSAIFAEVMNGKP-EFTDHLTHKLKHHPGQIEAAAIME
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  VPLSYTAGLLTGRPNSKA-IGPNG--ETLNAEEAFRVAGVNSGFFELQPKEGLALVNGTA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            WVMDSMSKGTDSYGVTTGFGATSHRRTKNGGALQKELIRFLNAGV-----FGNGTE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              FLRXQLXNSV--YGVTTGFGGSADTRTEDAISLQKALLEHQLCGVLPTSXDSFXLGRGLE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        SHLDEVKKMVAE-FRKPVVKLGGETLTVAQVAATAAKDNAKTVKVELSEGARAGVKASSD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Conservative 115; Mismatches
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      27.9%;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Score 938; DB 2; Length 71
Pred. No. 9e-66;
S; Mismatches 260; Indels
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Length 712;
                                                                                                                                                                                                                                   ----A
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Gaps
701
                                                                                                                                                                                                                                                                                                                                                      : 519
                                                                                                                                                                                              621
                                                                                                                670
                                                                                                                                                                                                                                                                                                                                                                                              436
                                                                                                                                                                                                                                                                                                                                                                                                                                                                         376
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      259
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           280
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            142
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    164
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 202
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       222
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          91
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               106
```

Search completed: September 9, 2004, 10:08:48 Job time: 32.1203 secs